Academic Catalogue

2020/2021

ASHESI UNIVERSITY

Table of Contents

Ashesi University 2020-2021 Academic Catalog

ACADEMIC PROGRAMS, DEGREES AND DEGREE REQUIREMENTS

Mission & Vision Statements

The mission of Ashesi University is to educate a new generation of ethical, entrepreneurial leaders in Africa; to cultivate within our students the critical thinking skills, the concern for others and the courage it will take to transform a continent.

Our vision is an African renaissance driven by a new generation of ethical, entrepreneurial leaders. We aim to educate such leaders, and to drive a movement in African higher education to scale up the education of such leaders.

Academic Message

An Ashesi student's academic purpose is excellence in citizenship, leadership and scholarship in Africa and in the larger global context.

Ashesi University Academic and Social Honor Codes

Academic Honor Code (2007): All members of each second-year class at Ashesi University vote on whether to pledge to abide by the Academic Honor Code or not. When a minimum of 66.7% of the class vote in favor of the pledge, the entire class is deemed committed to honoring the pledge, which simply states, "I will not cheat, and I will not allow my peers to cheat".

Social Honor Code (2018): Under the **code**, all members of the **Ashesi** community will now sign on to a new **pledge** of behavior; the **pledge** reads, "as a member of the **Ashesi** Community, I will act with honesty, integrity and respect for others, and will hold my peers accountable to abide by these principles and by the **university's code** of conduct."

Degrees offered

Bachelor of Science (BSc.)

Department of Business Administration

BSc. in Business Administration

Department of Computer Science

BSc. in Computer Science
BSc. in Management Information Systems

Department of Engineering

BSc. in Computer Engineering
BSc. in Electrical & Electronic Engineering
BSc. in Mechanical Engineering

Bachelor's Degree Requirements

Ashesi University offers an academic program consisting of minimum of 134 semester hours (33.5 semester units) of credit for the bachelor's degree. The degree consists of a hybrid of foundational liberal arts core concentrated in year one, a professional core in a major, and elective courses.

Ashesi's academic calendar is divided into two semesters *of 16 weeks each*. *For all first-year students, the academic calendar is divided into 14 weeks for the first semester and 18 weeks for the second semester.* Students typically take four semester units per semester. A semester unit (typically *36* classroom contact hours and *an average of 23* discussion/lab contact hours) is defined as three (3) hours per week of classroom time and 1 or 1.5 hours of discussion/lab time per week over a period of *twelve* weeks.

To earn a baccalaureate degree and be eligible for graduation, students are required to fulfil the following minimal requirements.

- Successful completion of at least 33.5 semester units, including all core and major requirements*
- A cumulative grade point average of 2.0 (C average) or higher
- Successful completion of the service-learning component**
- Successful completion of internship (required only for engineering students) ***
- Fulfilment of all financial obligations to the University.

* *Note that some Ashesi degree programmes require more than 33.5 units, depending on a student's math track.*

***The service-learning** component exists as another dimension of our commitment to nurture graduates who excel in citizenship. Service learning helps students develop a sense of citizenship by giving them an opportunity to become engaged with their surrounding community. Students must complete 40 hours of community service and fulfil this requirement in a variety of ways. The summer and Community Engagement Programmes office keeps a directory of non-profit organizations students can volunteer with.*

*** All Ashesi students are strongly encouraged to take up summer **internship** opportunities at the end of their second and third years. In order to ensure some level of familiarity with the practicing engineering profession, all Ashesi engineering students are required to either: do an internship at an engineering firm or an engineering-related internship at a non-engineering firm; shadow a practicing engineer; or engage in an engineering project for an external company.*

Graduation Honors

Students who earn a cumulative GPA of 3.50 to 3.69 for all undergraduate work earn ***Cum Laude*** (honors). Those with a cumulative GPA of 3.70 to 3.84 for all undergraduate work earn ***Magna Cum Laude*** (high honors). Students with a cumulative GPA of 3.85 or above for all undergraduate work earn ***Summa Cum Laude*** (highest honors).

Honors CGPA (Cum Laude)

Summa Cum Laude 3.85-4.00
(Highest Honors)
Magna Cum Laude 3.70-3.84
(High Honors)
Cum Laude 3.50-3.69
(Honors)
Bachelor's Degree 2.00-3.49

Cum Laude and Class Distinctions

Ashesi University College Honours	GPA	University of Cape Coast Honours	GPA
Summa Cum Laude (Highest honors)	3.85-4.00	First Class	3.55-4.00
Magna Cum Laude (High honors)	3.70-3.84		
Cum Laude (Honors)	3.50-3.69	Second Class (Upper)	2.95 – 3.54
Bachelor's Degree	2.00-3.45	Second Class (Lower)	2.45 – 2.94
		Third Class	2.0 – 2.49

Overview of Courses offered in Ashesi's Six Degree Programs

		Business Administration	Management Information Systems	Computer Science	Computer Engineering	Electrical and Electronic Engineering	Mechanical Engineering
LIBERAL ARTS & SCIENCES CORE	Humanities & Social Sciences	Written and Oral Comm. Text and Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 Microeconomics Macroeconomics *6.5 Ashesi Credits*	Written and Oral Comm. Text and Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 Microeconomics Macroeconomics *6.5 Ashesi Credits*	Written and Oral Comm. Text & Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 Principles of Economics *5.5 Ashesi Credits*	Written and Oral Comm. Text & Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 (for Engineers) Principles of Economics *5.5 Ashesi Credits*	Written and Oral Comm. Text & Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 (for Engineers) Principles of Economics *5.5 Ashesi Credits*	Written and Oral Comm. Text & Meaning Ashesi Seminar & Leadership 1* Leadership 2* Leadership 3* Leadership 4 (for Engineers) Principles of Economics *5.5 Ashesi Credits*
	Business	Found. of Design & Entre. I Found. of Design & Entre. II *2 Ashesi Credits*	Found. of Design & Entre. I Found. of Design & Entre. II *2 Ashesi Credits*	Found. of Design & Entre. I Found. of Design & Entre. II Finance for Non-Finance Mgrs *3 Ashesi Credits*	Found. of Design & Entre. I Found. of Design & Entre. II *2 Ashesi Credits*	Found. of Design & Entre. I Found. of Design & Entre. II *2 Ashesi Credits*	Found. of Design & Entre. I Found. of Design & Entre. II *2 Ashesi Credits*
	Mathematics & Quantitative	Pre-Calculus 1 / Calculus 1 Pre-Calculus 2 / Calculus 2 Applied Calc (Pre-Calc track only) Statistics Quantitative Methods *4 Ashesi Credits* *(5 if Pre-Calc track)*	Pre-Calculus 1 / Calculus 1 Pre-Calculus 2 / Calculus 2 Applied Calc (Pre-Calc track only) Statistics Quantitative Methods *4 Ashesi Credits* *(5 if Pre-Calc track)*	Pre-Calculus 1 / Calculus 1 Pre-Calculus 2 / Calculus 2 Applied Calc (Pre-Calc track only) Statistics Quantitative Methods OR Multivariable Calc. & Linear Alg. *4 Ashesi Credits* *(5 if Pre-Calc track)*	Calculus for Engineering / Calc 1 Calculus 2 (only if Calculus 1) Multivariable Calc. & Linear Alg. Diff. Eqs. & Numerical Methods Statistics for Engineering *4 Ashesi Credits* *(5 if Calc1&2 track)*	Calculus for Engineering / Calc 1 Calculus 2 (only if Calculus 1) Multivariable Calc. & Linear Alg. Diff. Eqs. & Numerical Methods Statistics for Engineering *4 Ashesi Credits* *(5 if Calc1&2 track)*	Calculus for Engineering / Calc 1 Calculus 2 (only if Calculus 1) Multivariable Calc. & Linear Alg. Diff. Eqs. & Numerical Methods Statistics for Engineering *4 Ashesi Credits* *(5 if Calc1&2 track)*
	Computing	Intro to Computing & IS *1 Ashesi Credit*	Intro to Computing & IS *1 Ashesi Credit*	Intro to Computing & IS *1 Ashesi Credit*	Computer Programming for Eng. *1 Ashesi Credit*	Computer Programming for Eng. *1 Ashesi Credit*	Computer Programming for Eng. *1 Ashesi Credit*
	Science	*0 Ashesi Credit*	*0 Ashesi Credit*	*0 Ashesi Credit*	Physics I: Mechanics Physics II: Electromagnetism Material Science & Chemistry *3 Ashesi Credits*	Physics I: Mechanics Physics II: Electromagnetism Material Science & Chemistry *3 Ashesi Credits*	Physics I: Mechanics Physics II: Electromagnetism Material Science & Chemistry *3 Ashesi Credits*
	Research / Project Prep.	Research Methods *1 Ashesi Credit*	Research Methods *1 Ashesi Credit*	Research Methods *1 Ashesi Credit*	3rd Yr. Grp. Project & Seminar* *0.5 Ashesi Credit*	3rd Yr. Grp. Project & Seminar* *0.5 Ashesi Credit*	3rd Yr. Grp. Project & Seminar* *0.5 Ashesi Credit*
	Non-Major Electives	3 Non-Major Electives including at least 1 African studies *3 Ashesi Credits*	3 Non-Major Electives including at least 1 African studies *3 Ashesi Credits*	3 Non-Major Electives including at least 1 African studies *3 Ashesi Credits*	2 Non-Major Electives including at least 1 African studies *2 Ashesi Credits*	2 Non-Major Electives including at least 1 African studies *2 Ashesi Credits*	2 Non-Major Electives including at least 1 African studies *2 Ashesi Credits*
	Total Credits - Liberal Arts & Sciences Core	**17.5 Ashesi Credits (18.5 if Pre-Calc track)**	**17.5 Ashesi Credits (18.5 if Pre-Calc track)**	**17.5 Ashesi Credits (18.5 if Pre-Calc track)**	**18 Ashesi Credits (19 if Calc1&2 track)**	**18 Ashesi Credits (19 if Calc1&2 track)**	**18 Ashesi Credits (19 if Calc1&2 track)**
MAJOR	Required Major Classes	Introduction to Finance Financial Accounting Marketing Managerial Accounting Corporate Finance Organisational Behaviour International Trade & Policy Operations Management Business Law Competitive Strategy Investments *11 Ashesi Credits*	Finance for Non-Finance Mgrs Managerial Accounting Competitive Strategy Computer Programming for CS Discrete Structures & Theory Database Systems Web Technologies Systems Analysis & Design Information & Systems Security E-Commerce IT Infrastructure System Administration Lab* IS Project Management* *12 Ashesi Credits*	Computer Programming for CS Discrete Structures and Theory Data Structures and Algorithms Computer Org. & Arch. Human Computer Interaction Software Engineering Database Systems Intermediate Comp. Prog. Web Technologies Networks & Data Comm. Operating Systems Algorithm Design & Analysis *12 Ashesi Credits*	Introduction to Engineering Instrumentation for Engineering* Applied Programming for Eng.* System Dynamics Control Systems Digital Systems Design Circuits & Electronics Project Mgmt. & Prof. Practice Embedded Systems Data Structures & Algorithms Operating Systems Networks & Distr. Computing Communications Systems Computer Org. & Arch. *13 Ashesi Credits*	Introduction to Engineering Instrumentation for Engineering* Applied Programming for Eng.* System Dynamics Control Systems Digital Systems Design Circuits & Electronics Project Mgmt. & Prof. Practice Embedded Systems Intro to Electrical Machines & Power Electronics Advanced Electrical Machines & Power Electronics Fundamentals of Thermal Fluid Science & Heat Transfer Communications Systems Power Engineering *13 Ashesi Credits*	Introduction to Engineering Instrumentation for Engineering* Applied Programming for Eng.* System Dynamics Control Systems Manufacturing Circuits & Electronics Project Mgmt. & Prof. Practice Mechanical Machine Design Intro to Electrical Machines & Power Electronics Fluid Dynamics & Applications Fundamentals of Thermal Fluid Science & Heat Transfer Mechanics of Materials / Structural Engineering Thermal Systems & Applications *13 Ashesi Credits*
	Major Electives	3 BA Electives *3 Ashesi Credits*	2 MIS Electives *2 Ashesi Credits*	2 CS Electives *2 Ashesi Credits*	2 CE Electives *2 Ashesi Credits*	2 EE Electives *2 Ashesi Credits*	2 ME Electives *2 Ashesi Credits*
	Capstone	Capstone 1 (could be elective) Capstone 2 *2 Ashesi Credits*	Capstone 1 (could be elective) Capstone 2 *2 Ashesi Credits*	Capstone 1 (could be elective) Capstone 2 *2 Ashesi Credits*	Capstone *1 Ashesi Credit*	Capstone *1 Ashesi Credit*	Capstone *1 Ashesi Credit*
	Total Credits - Major	**16 Credits**	**16 Credits**	**16 Credits**	**16 Credits**	**16 Credits**	**16 Credits**
	TOTAL CREDITS OVERALL	**33.5 Ashesi Credits (34.5 if Pre-Calc track)**	**33.5 Ashesi Credits (34.5 if Pre-Calc track)**	**33.5 Ashesi Credits (34.5 if Pre-Calc track)**	**34 Ashesi Credits (35 if Calc1&2 track)**	**34 Ashesi Credits (35 if Calc1&2 track)**	**34 Ashesi Credits (35 if Calc1&2 track)**

Transition Plan for Curriculum Revised in 2018:

In 2018 the curriculum was revised, and the transition plan will include the 2021 and 2022 catalogs

New 4 Year Curriculum (Class of 2022 & Later)

Sem	BA	MIS	CS
Year 1			
Sem 1	Giving Voice to Values Precalculus 1 or Calculus 1 Written & Oral Communication Foundations of Design and Entrepreneurship I Introduction to Computing and Information Systems		
Sem 2	Leadership Seminar 1* Precalculus 2 or Calculus 2 Text and Meaning Foundations of Design and Entrepreneurship II Organizational Behaviour	Computer Programming for CS	Computer Programming for CS
Summer	Applied Calculus (Pre-Calculus Students only)		
Year 2			
Sem 1	Leadership Seminar 2* Statistics Microeconomics Financial Accounting **Non-Major Elective**[1]	Leadership Seminar 2* Statistics Microeconomics Discrete Structures & Theory **Non-Major Elective**[1] or Data Structures[2]	Leadership Seminar 2* Statistics Data Structures & Algorithms Discrete Structures & Theory **Non-Major Elective**[1] or Microeconomics[3]
Sem 2	Leadership Seminar 3* Quantitative Methods Macroeconomics Marketing[1] Introduction to Finance	Leadership Seminar 3* Quantitative Methods Macroeconomics[1] Database Systems Finance for non-Finance Managers	Leadership Seminar 3* Quantitative Methods or Multivariable Calc. & Linear Algebra Intermediate Comp Prog Database Systems Finance for non-Finance Managers[1]
Year 3			
Sem 1	Research Methods Operations Management Investments Leadership Seminar 4 or **Elective**†	Research Methods Web Technologies Systems Analysis & Design Leadership Seminar 4 or **Elective**†	Research Methods Web Technologies Computer Org & Architecture Leadership Seminar 4 or **Elective**†
Sem 2	Managerial Accounting International Trade & Policy **Elective**† Leadership Seminar 4 or **Elective**†	Managerial Accounting IT Infrastructure Systems Administration Lab* IS Project Management* Leadership Seminar 4 or **Elective**†	Software Engineering Algorithms Design & Analysis Principles of Economics Leadership Seminar 4 or **Elective**†
Year 4			
Sem 1	Corporate Finance Business Law **Elective**† Capstone 1	E-Commerce Information and Systems Security **Elective**† Capstone 1	Operating Systems Human Computer Interaction **Elective**† Capstone 1
Sem 2	Competitive Strategy **Elective**† **Elective**† Capstone 2	Competitive Strategy **Elective**† **Elective**† Capstone 2	Networks & Data Communications **Elective**† **Elective**† Capstone 2

* Half-credit course

[1] Students who wish to study French will take *Beginning French 1* as their non-major elective in Year 2 Sem 1. To continue with *Beginning French 2* in Year 2 Sem 2, they will postpone one required course (*Marketing* for BA majors, *Macroeconomics* for MIS majors, and *Finance for Non-Finance Managers* for CS majors) to the summer or to the elective slot in Year 3 Sem 2. They can continue with their study of French by taking *Professional French 1* and *Professional French 2* as course overloads in Year 3. Alternatively, they can free up space for French in Year 3 by taking summer courses after Year 2.

[2] Data Structures counts as a major elective for MIS majors and is encouraged for those who plan to do software development or those entering Year 2 who are still unsure about whether to major in MIS or CS

[3] Although *Principles of Economics* is prescribed for CS majors, *Microeconomics* can be substituted. As such, *Microeconomics* is recommended for students entering Year 2 who are still unsure about whether to major in CS or MIS

† Students have flexibility in scheduling electives (major and non-major) in Years 3 and 4, but must ensure that they take the total required number of major electives (3 for BA, 2 for MIS & CS) and non-major electives (3, including at least 1 Africana).

New 4 Year Curriculum (Transition Plan – Class of 2021)

In August 2018, the Class of 2021 entered Year 2. Semesters, up to the current one are greyed out and the plan for the remaining semesters are shown.

Sem	BA	MIS	CS
Year 1			
Sem 1	Giving Voice to Values Precalculus 1 or Calculus 1 Written & Oral Communication Foundations of Design and Entrepreneurship I Introduction to Computing and Information Systems		
Sem 2	Leadership Seminar 1* Precalculus 2 or Calculus 2 Text and Meaning Foundations of Design and Entrepreneurship II Organizational Behavior	Computer Programming for CS	Computer Programming for CS
Summer	Applied Calculus (Pre-Calculus Students only)		
Year 2			
Sem 1	Leadership Seminar 2* Statistics Microeconomics Financial Accounting **Non-Major Elective**[1]	Leadership Seminar 2* Statistics Microeconomics Discrete Structures & Theory Finance for non-Finance Managers	Leadership Seminar 2* Statistics Data Structures & Algorithms Discrete Structures & Theory Finance for non-Finance Managers
Sem 2	Leadership Seminar 3* Quantitative Methods Macroeconomics Marketing[1] Introduction to Finance	Leadership Seminar 3* Quantitative Methods Macroeconomics Database Systems **Non-Major Elective**[1]	Leadership Seminar 3* Quantitative Methods or Multivariable Calc. & Linear Algebra Intermediate Comp Prog Database Systems **Non-Major Elective**[1]
Year 3			
Sem 1	Research Methods Operations Management Investments Leadership Seminar 4 or **Elective**†	Research Methods Web Technologies Systems Analysis & Design Leadership Seminar 4 or **Elective**†	Research Methods Web Technologies Computer Org & Architecture Leadership Seminar 4 or **Elective**†
Sem 2	Managerial Accounting International Trade & Policy **Elective**† Leadership Seminar 4 or **Elective**†	Managerial Accounting IT Infrastructure Systems Administration Lab* IS Project Management* Leadership Seminar 4 or **Elective**†	Software Engineering Algorithms Design & Analysis Principles of Economics Leadership Seminar 4 or **Elective**†
Year 4			
Sem 1	Corporate Finance Business Law **Elective**† Capstone 1	E-Commerce Information and Systems Security **Elective**† Capstone 1	Operating Systems Human Computer Interaction **Elective**† Capstone 1
Sem 2	Competitive Strategy **Elective**† **Elective**† Capstone 2	Competitive Strategy **Elective**† **Elective**† Capstone 2	Networks & Data Communications **Elective**† **Elective**† Capstone 2

* Half-credit course

[1] Students who have started studying French and wish to continue will take *Beginning French 2* in Year 2 Sem 2 as a non-major elective (BA majors would need to postpone *Marketing* to the summer or to the elective slot in Year 3 Sem 2). The study of French can continue in Year 3 by taking *Professional French 1* and *Professional French 2* as course overloads. Alternatively, students can free up space for French in Year 3 by taking summer courses after Year 2.

† Students have flexibility in scheduling electives (major and non-major) in Years 3 and 4, but must ensure that they ultimately have the needed number of major electives (3 for BA, 2 for MIS & CS) and non-major electives (3, including at least 1 Africana).

New 4 Year Curriculum (Transition Plan – Class of 2021)

Semester	Computer Engineering	Electrical and Electronic Engineering	Mechanical Engineering
Year 1			
Sem 1 Sep - Jan	Written and Oral Communication	Written and Oral Communication	Written and Oral Communication
	Calculus I	Calculus I	Calculus I
	Computer Programming for Engineering	Computer Programming for Engineering	Computer Programming for Engineering
	Giving Voice to Values	Giving Voice to Values	Giving Voice to Values
	Foundations Design & Entrepreneurship 1	Foundations Design & Entrepreneurship 1	Foundations Design & Entrepreneurship 1
Sem 2 Jan - May	Text and Meaning	Text and Meaning	Text and Meaning
	Calculus II	Calculus II	Calculus II
	Physics I: Mechanics	Physics I: Mechanics	Physics I: Mechanics
	Foundations Design & Entrepreneurship 2	Foundations Design & Entrepreneurship 2	Foundations Design & Entrepreneurship 2
	Leadership Seminar 1*	Leadership Seminar 1*	Leadership Seminar 1*
Summer	Introduction to Engineering	Introduction to Engineering	Introduction to Engineering
	Applied Programming for Engineers*	Applied Programming for Engineers*	Applied Programming for Engineers*
Year 2			
Sem 1 Aug - Dec	Physics II: Electromagnetism	Physics II: Electromagnetism	Physics II: Electromagnetism
	Statistics for Engineering	Statistics for Engineering	Statistics for Engineering
	Multivariable Calculus & Linear Algebra	Multivariable Calculus & Linear Algebra	Multivariable Calculus & Linear Algebra
	Data Structures & Algorithms	Thermodynamics	Thermodynamics
	Leadership Seminar 2*	Leadership Seminar 2*	Leadership Seminar 2*
Sem 2 Jan - May	Circuits and Electronics	Circuits and Electronics	Circuits and Electronics
	Materials Science & Chemistry	Materials Science & Chemistry	Materials Science & Chemistry
	Differential Eqs & Numerical Methods	Differential Eqs & Numerical Methods	Differential Eqs & Numerical Methods
	~~Text and Meaning~~	~~Text and Meaning~~	~~Text and Meaning~~
	Leadership Seminar 3*	Leadership Seminar 3*	Leadership Seminar 3*
Year 3			
Sem 1 Aug - Dec	Computer Organization & Architecture	Intro Electrical Machines & Power Elect	Intro Electrical Machines & Power Elect
	System Dynamics	System Dynamics	System Dynamics
	Communication Systems	Communication Systems	Mechanics of Materials
	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)
	Instrumentation for Engineering*	Instrumentation for Engineering*	Instrumentation for Engineering*
Sem 2 Jan - May	Control Systems	Control Systems	Control Systems
	Networks & Data Communications	Adv Electrical Machines & Power Elect	Mechanical Machine Design
	Digital Systems Design	Digital Systems Design	Principles of Economics
	Principles of Economics	Principles of Economics	Fluid Mechanics
	Year 3 Group Project & Seminar*	Year 3 Group Project & Seminar*	Year 3 Group Project & Seminar*
Year 4			
Sem 1 Aug - Dec	Operating Systems	Power Engineering	African Studies Elective
	CE Elective	EE Elective	ME Elective
	Embedded Systems	Embedded Systems	Heat Transfer
	Elective	Elective	Elective
Sem 2 Jan - May	Project Mgmt and Professional Practice	Project Mgmt and Professional Practice	Project Mgmt and Professional Practice
	CE Elective	EE Elective:	ME Elective
	African Studies Elective	African Studies Elective	Manufacturing Processes
	Senior Project & Seminar	Senior Project & Seminar	Senior Project & Seminar

Year IV Students desiring to do a Semester II elective should consider doing Africana in Semester 1 in place of "Elective" eg Year IV EE students wishing to do Networks should do Africana in Semester 1 and Networks in Semester II

New 4 Year Curriculum (Class of 2022 and beyond)

Semester	Computer Engineering	Electrical and Electronic Engineering	Mechanical Engineering
Year 1			
Sem 1	Written and Oral Communication	Written and Oral Communication	Written and Oral Communication
	Calculus for Engineering	Calculus for Engineering	Calculus for Engineering
Sep - Jan	Introduction to Engineering	Introduction to Engineering	Introduction to Engineering
	Giving Voice to Values	Giving Voice to Values	Giving Voice to Values
	Foundations Design & Entrepreneurship 1	Foundations Design & Entrepreneurship 1	Foundations Design & Entrepreneurship 1
Sem 2	Computer Programming for Engineering	Computer Programming for Engineering	Computer Programming for Engineering
	Multivariable Calculus & Linear Algebra	Multivariable Calculus & Linear Algebra	Multivariable Calculus & Linear Algebra
Jan - May	Physics I: Mechanics	Physics I: Mechanics	Physics I: Mechanics
	Foundations Design & Entrepreneurship 2	Foundations Design & Entrepreneurship 2	Foundations Design & Entrepreneurship 2
	Leadership Seminar 1*	Leadership Seminar 1*	Leadership Seminar 1*
Year 2			
Sem 1	Physics II: Electromagnetism	Physics II: Electromagnetism	Physics II: Electromagnetism
	Statistics for Engineering	Statistics for Engineering	Statistics for Engineering
Aug - Dec	Applied Programming for Engineers*	Applied Programming for Engineers*	Applied Programming for Engineers*
	Data Structures & Algorithms	Thermodynamics	Thermodynamics
	Leadership Seminar 2*	Leadership Seminar 2*	Leadership Seminar 2*
Sem 2	Circuits and Electronics	Circuits and Electronics	Circuits and Electronics
	Materials Science & Chemistry	Materials Science & Chemistry	Materials Science & Chemistry
Jan - May	Differential Eqs & Numerical Methods	Differential Eqs & Numerical Methods	Differential Eqs & Numerical Methods
	Text and Meaning	Text and Meaning	Text and Meaning
	Leadership Seminar 3*	Leadership Seminar 3*	Leadership Seminar 3*
Year 3			
Sem 1	Computer Organization & Architecture	Intro Electrical Machines & Power Elect	Intro Electrical Machines & Power Elect
	System Dynamics	System Dynamics	System Dynamics
Aug - Dec	Communication Systems	Communication Systems	Mechanics of Materials
	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)	Leadership Seminar 4 for Engineers (Includes Year 3 Group Project)
	Instrumentation for Engineering*	Instrumentation for Engineering*	Instrumentation for Engineering*
Sem 2	Control Systems	Control Systems	Control Systems
	Networks & Data Communications	Adv Electrical Machines & Power Elect	Mechanical Machine Design
Jan - May	Digital Systems Design	Digital Systems Design	Principles of Economics
	Principles of Economics	Principles of Economics	Fluid Mechanics
	Year 3 Group Project & Seminar*	Year 3 Group Project & Seminar*	Year 3 Group Project & Seminar*
Year 4			
Sem 1	Operating Systems	Power Engineering	African Studies Elective
	CE Elective	EE Elective	ME Elective
Aug - Dec	Embedded Systems	Embedded Systems	Heat Transfer
	Elective	Elective	Elective
Sem 2	Project Mgmt and Professional Practice	Project Mgmt and Professional Practice	Project Mgmt and Professional Practice
	CE Elective	EE Elective	ME Elective
Jan - May	African Studies Elective	African Studies Elective	Manufacturing Processes
	Senior Project & Seminar	Senior Project & Seminar	Senior Project & Seminar

EE yr 4: students wishing to do Networks should do Africana in sem 1 and Networks in sem II
CE: yr4: if desiring to do a Sem II elective, consider doing Africana in Sem 1

PLANS OF STUDY PER YEAR, SEMESTER, and PROGRAM

Plan of Study: Business Administration

ASHESI UNIVERSITY (ASHESI)
Department of Business Administration

BSc. Business Administration

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 SEMESTER 1 & 2	**YEAR 2** SEMESTER 3 & 4	**YEAR 3** SEMESTER 5 & 6	**YEAR 4** SEMESTER 7 & 8
SEMESTER 1 • Ashesi Success (0 credit) • Pre-calculus 1 or Calculus 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Computing & Information Systems (4 credits) **SEMESTER 2** • Leadership Seminar 1 (2 credits) • Pre-calculus 2 or Calculus 2 (4 credits) • Text & Meaning (4 credits) • Foundations of Design & Entrepreneurship 2 (4 credits) • Organizational Behavior (4 credits) **Summer** • Applied Calculus (for Pre-calculus students only) (4 credits)	**SEMESTER 3** • Leadership Seminar 2 (2 credits) • Statistics (4 credits) • Micro-economics (4 credits) • Financial Accounting (4 credits) • Non-Major Elective (4 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Quantitative Methods (4 credits) • Macro-Economics (4 credits) • Marketing (4 credits) • Intro to Finance (4 credits)	**SEMESTER 5** • Research Methods (4 credits) • Operations Management (4 credits) • Investments (4 credits) • Leadership Seminar IV or Elective (4 credits) **SEMESTER 6** • Managerial Accounting (4 credits) • International Trade & Policy (4 credits) • Business Elective (4 credits) • Business Elective (4 credits)	**SEMESTER 7** • Cooperate Finance (4 credits) • Business Law (4 credits) • Elective (4 credits) • Capstone 1 (4 credits) **SEMESTER 8** • Competitive Strategy (4 credits) • Elective (4 credits) • Elective (4 credits) • Capstone 2 (4 credits)
Total Credits: 34-38	Total Credits: 36	Total Credits: 32	Total Credits: 32

Total Credits for BA Program=134-138

Plan of Study: Computer Science

ASHESI UNIVERSITY (ASHESI)
Department of Computer Science and Information Systems

BSc. Computer Science

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 SEMESTER 1 & 2	**YEAR 2** SEMESTER 3 & 4	**YEAR 3** SEMESTER 5 & 6	**YEAR 4** SEMESTER 7 & 8
SEMESTER 1 • Ashesi Success (0 credit) • Pre-calculus 1 or Calculus 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Computing & Information Systems (4 credits) **SEMESTER 2** • Leadership Seminar 1 (2 credits) • Pre-calculus 2 or Calculus 2 (4 credits) • Text & Meaning (4 credits) • Foundations of Design & Entrepreneurship 2 (4 credits) • Computer Programming for CS (4 credits)	**SEMESTER 3** • Leadership Seminar 2 (2 credits) • Statistics (4 credits) • Discrete Structures & Theory (4 credits) • Data Structures & Algorithms (4 credits) • Non-Major Elective or Micro-economics (4 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Quantitative Methods or Multi Variable Calc (4 credits) • Intermediate Computer Programming (4 credits) • Finance for non-finance systems (4 credits) • Database Systems (4 credits)	**SEMESTER 5** • Research Methods (4 credits) • Web Technologies (4 credits) • Computer Org. & Arch (4 credits) • Leadership Seminar 4 or Elective (4 credits) **SEMESTER 6** • Software Engineering (4 credits) • Algorithms Design & Analysis (4 credits) • Principles of Economics (4 credits) • Major Elective (4 credits)	**SEMESTER 7** • Operating Systems (4 credits) • Human Computer Interaction (4 credits) • Elective (4 credits) • Capstone 1 (4 credits) **SEMESTER 8** • Networks & Data Communications (4 credits) • Elective (4 credits) • Elective (4 credits) • Capstone 2 (4 credits)
Total Credits: 34	Total Credits: 36	Total Credits: 32	Total Credits: 32

Total Credits for CS Program=134

Plan of Study: Management Information Systems

ASHESI UNIVERSITY (ASHESI)
Department of Computer Science and Information Systems

BSc. Management Information Systems

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 **SEMESTER 1 & 2**	**YEAR 2** **SEMESTER 3 & 4**	**YEAR 3** **SEMESTER 5 & 6**	**YEAR 4** **SEMESTER 7 & 8**
SEMESTER 1 • Ashesi Success (0 credit) • Pre-calculus 1 or Calculus 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Computing & Information Systems (4 credits) **SEMESTER 2** • Leadership Seminar 1 (2 credits) • Pre-calculus 2 or Calculus 2 (4 credits) • Text & Meaning (4 credits) • Foundations of Design & Entrepreneurship 2 (4 credits) • Computer Programming for CS (4 credits)	**SEMESTER 3** • Leadership Seminar 2 (2 credits) • Statistics (4 credits) • Micro-Economics (4 credits) • Discrete Structures & Theory (4 credits) • Non-Major Elective or Data Structures (4 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Quantitative Methods (4 credits) • Macro-economics (4 credits) • Database Systems (4 credits) • Finance for non-finance managers (4 credits)	**SEMESTER 5** • Leadership Seminar 4 (4 credits) • Research Methods (4 credits) • Web Technologies (4 credits) • Systems Analysis & Design (4 credits) **SEMESTER 6** • Major Elective (4 credits) • Managerial Accounting (4 credits) • IT Infrastructure (4 credits) • Systems Administration Laboratory (2 credits) • IS Project Management (2 credits)	**SEMESTER 7** • E-Commerce (4 credits) • Information and Systems Security (4 credits) • Elective (4 credits) • Capstone 1 (4 credits) **SEMESTER 8** **Take the following 12 credits of graduate courses** • Competitive Strategy (4 credits) • Capstone 2 (4 credits) • Elective (4 credits) • Elective (4 credits)
Total Credits: 34	Total Credits: 36	Total Credits: 32	Total Credits: 32

Total Credits for MIS Program=134

Plan of Study: Computer Engineering

ASHESI UNIVERSITY (ASHESI)
Department of Engineering

BSc. Computer Engineering

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 **SEMESTER 1 & 2**	**YEAR 2** **SEMESTER 3 & 4**	**YEAR 3** **SEMESTER 5 & 6**	**YEAR 4** **SEMESTER 7 & 8**
SEMESTER 1 • Ashesi Success (0 credit) • Calculus for Engineering 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Engineering (4 credits) **SEMESTER 2** • Comp. Programming for Engineering (4 credits) • Multivariable Calculus & Linear Algebra (4 credits) • Physics 1: Mechanics (4 credits) • Foundations of Design & Entrepreneurship 2 (4 credits) • Leadership Seminar 1 (2 credits)	**SEMESTER 3** • Physics 2: Electro-magnetism (4 credits) • Statistics for Engineering (4 credits) • Applied Programming for Engineers (2 credits) • Data Structures & Algorithms (4 credits) • Leadership Seminar 2 (2 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Circuits & Electronics (4 credits) • Material Science & Chemistry (4 credits) • Differential Eqns & Numerical Methods (4 credits) • Text & Meaning (4 credits)	**SEMESTER 5** • Computer Organization & Architecture (4 credits) • System Dynamics (4 credits) • Communication Systems (4 credits) • Leadership 4 (4 credits) • Instrumentation for Engineering (2 credits) **SEMESTER 6** • Control Systems (4 credits) • Networks & Data Communications (4 credits) • Digital Systems Design (4 credits) • Principles of Economics (4 credits) • Year 3 Group Project & Seminar (2 credits)	**SEMESTER 7** • Operating Systems (4 credits) • CE Elective (4 credits) • Embedded Systems (4 credits) • Elective (4 credits) **SEMESTER 8** • Project Mgt and Professional Practice (4 credits) • CE Elective (4 credits) • African Studies Elective (4 credits) • Senior Project & Seminar (4 credits)
Total Credits: 34	Total Credits: 34	Total Credits: 36	Total Credits: 32

Total Credits for Computer Engineering Program=136

Plan of Study: Electrical & Electronic Engineering

ASHESI UNIVERSITY (ASHESI)
Department of Engineering

BSc. Electrical Engineering

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 **SEMESTER 1 & 2**	**YEAR 2** **SEMESTER 3 & 4**	**YEAR 3** **SEMESTER 5 & 6**	**YEAR 4** **SEMESTER 7 & 8**
SEMESTER 1 • Ashesi Success (0 credit) • Calculus for Engineering 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Engineering (4 credits) **SEMESTER 2** • Comp. Programming for Engineering (4 credits) • Multivariable Calculus & Linear Algebra (4 credits) • Physics 1: Mechanics • Foundations of Design & Entrepreneurship 2 (4 credits) • Leadership Seminar 1 (2 credits)	**SEMESTER 3** • Physics 2: Electro-magnetism (4 credits) • Statistics for Engineering (4 credits) • Applied Programming for Engineers (2 credits) • Thermodynamics (4 credits) • Leadership Seminar 2 (2 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Circuits & Electronics (4 credits) • Material Science & Chemistry (4 credits) • Differential Eqns & Numerical Methods (4 credits) • Text & Meaning (4 credits)	**SEMESTER 5** • Intro. To Electrical Machines & Power Electronics (4 credits) • System Dynamics (4 credits) • Communication Systems (4 credits) • Leadership 4 (4 credits) • Instrumentation for Engineering (2 credits) **SEMESTER 6** • Control Systems (4 credits) • Electrical Machines II (4 credits) • Digital Systems Design (4 credits) • Principles of Economics (4 credits) • Year 3 Group Project & Seminar (2 credits)	**SEMESTER 7** • Power Engineering (4 credits) • EE Elective (4 credits) • Embedded Systems (4 credits) • Elective (4 credits) **SEMESTER 8** • Project Mgt and Professional Practice (4 credits) • EE Elective (4 credits) • African Studies Elective (4 credits) • Senior Project & Seminar (4 credits)
Total Credits: 34	Total Credits: 34	Total Credits: 36	Total Credits: 32

Total Credits for Electrical Engineering Program=136

Plan of Study: Mechanical Engineering

ASHESI UNIVERSITY (ASHESI)
Department of Engineering

BSc. Mechanical Engineering

Ashesi Courses:

Freshman Undergraduate	Sophomore Undergraduate	Junior Undergraduate	Senior Undergraduate
YEAR 1 **SEMESTER 1 & 2**	**YEAR 2** **SEMESTER 3 & 4**	**YEAR 3** **SEMESTER 5 & 6**	**YEAR 4** **SEMESTER 7 & 8**
SEMESTER 1 • Ashesi Success (0 credit) • Calculus for Engineering 1 (4 credits) • Written & Oral Communication (4 credits) • Foundations of Design & Entrepreneurship (4 credits) • Intro. To Engineering (4 credits) **SEMESTER 2** • Comp. Programming for Engineering (4 credits) • Multivariable Calculus & Linear Algebra (4 credits) • Physics 1: Mechanics (4 Credits) • Foundations of Design & Entrepreneurship 2 (4 credits) • Leadership Seminar 1 (2 credits)	**SEMESTER 3** • Physics 2: Electro-magnetism (4 credits) • Statistics for Engineering (4 credits) • Applied Programming for Engineers (2 credits) • Thermodynamics (4 credits) • Leadership Seminar 2 (2 credits) **SEMESTER 4** • Leadership Seminar 3 (2 credits) • Circuits & Electronics (4 credits) • Material Science & Chemistry (4 credits) • Differential Eqns & Numerical Methods (4 credits) • Text & Meaning (4 credits)	**SEMESTER 5** • Intro. To Electrical Machines & Power Electronics (4 credits) • System Dynamics (4 credits) • Mechanics of Materials (4 credits) • Leadership 4 (4 credits) • Instrumentation for Engineering (2 credits) **SEMESTER 6** • Control Systems (4 credits) • Mechanical Machine Design (4 credits) • Principles of Economics (4 credits) • Fluid Mechanics (4 credits) • Year 3 Group Project & Seminar (4 credits)	**SEMESTER 7** • African Studies Elective (4 credits) • ME Elective (4 credits) • Heat Transfer (4 credits) • Elective (4 credits) **SEMESTER 8** • Project Mgt and Professional Practice (4 credits) • ME Elective (4 credits) • Manufacturing Processes • Senior Project & Seminar (4 credits)
Total Credits: 34	Total Credits: 34	Total Credits: 36	Total Credits: 32

Total Credits for ME Program= 136

DESCRIPTIONS OF COURSES and PREREQUISITES

Business Administration

BUSA 100 Principles of Economics
Required for all CS & ENG majors
Prerequisite: Pre-Calculus 2 or Calculus 1
Offered: Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course will introduce students to the principles of microeconomics and macroeconomics. It is aimed at equipping students with economic knowledge relevant in helping them contribute to economic discussions and make better business decisions. The course will also enable students understand the connection between microeconomics and macroeconomics, and their practical relationships. We will develop economic tools that are necessary for strategic decision making in the business environment.
The aim of the course is to introduce students to the fundamental principles, ideas, theories and tools of microeconomic and macroeconomic theories. At the end of the course students should have achieved some understanding of and gained competence in using economic ideas, tools and procedures.

BUSA 161/A Foundation of Design & Entrepreneurship I
Required for all Ashesi students
Prerequisite: none
Offered: Fall
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This is the first part of a yearlong course on design and entrepreneurship. The goal of the course is to immerse all first-year students of the University, irrespective of major, into the world of design thinking, entrepreneurship and business management. For this semester's work, the course will cover two main aspects: design thinking for problem solving and entrepreneurial opportunity analysis. The two areas will involve students undertaking exercises to help hone their skills in design thinking, conduct business opportunity identification and analysis culminating in business concepts. Students will then develop and validate their business concepts and present them for evaluation. The first half of this semester will look at creativity, design thinking and innovation with the aim of positioning students to develop an innovative posture. Class sessions and activities will see students uncovering how the brain creates and prevents creativity, how to reframe problems, conduct research, conduct sensemaking to uncover insights from research, develop a point of view, ideate, prototype and develop solutions to the problems identified. The key focus areas are teaching them how to deal with ambiguity and be innovative and creative, in the midst of limitations and constraints. Students will also learn how to prototype and test their ideas with users. The second half of the semester will be structured to help students evaluate their design proposals and decide on how to take them further. Building on the background from the design module, students will study business opportunity analysis and business model development as entrepreneurs and intrapreneurs. They will run through the theories of business venture modelling to help them model their business concepts. This will serve as a basis for using tools like the business model canvas, which will require that students identify potential customer segments, develop and test value propositions that address their pain points, problems or needs they discovered in the first part of the course. At the end of the semester, students will reflect on the course, as well as present their business concepts for evaluation and selection for the business simulation project in the second semester.

BUSA 162 Foundation of Design & Entrepreneurship II
Required for all Ashesi students
Prerequisite: FDE 1
Offered: Spring
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course is a continuation of Foundations of Design and Entrepreneurship (FDE) I and aims to build on the work done through business simulations on the solution concepts developed. The venture teams will start the semester with continued prototyping, developing and testing their Minimum Viable Products (MVP), launching their venture concept and running post-launch promotions, all the while learning about the key entrepreneurship concepts that pertain to the various activities performed in this course. However, the venture teams will not be registered legal entities during the period of the class (perhaps afterwards). Hence, we refer to the nature of the business the venture team conducts during the semester as a business simulation.

To elaborate on the process, by conducting Customer Discovery, Customer Validation and exploring Customer Creation and Company Building hypothetically, FDE II teams can test and update their business concepts into validated business ideas that can potentially be explored post FDE. The testing process is iterative as teams will need to incorporate new information or pivot based on outcomes from testing in the rather continuous customer development process. Such informed customer discovery, validation and creation activities will reveal the viability of the business concept and therefore help the team determine if a business concept has prospects for company building or not by the end of the semester. The simulation process therefore provides a rigorous experiential learning corridor through which FDE teams encounter, experience and process relevant business knowledge for business venturing in entrepreneurship (as well as in intrapreneurship at the corporate level).
Towards the end of the semester, students will be guided in determining how they will transition out of the FDE program after two semesters. If they determine that their business venture should go into the Company Building phase, they will have the opportunity to enroll in the student led Ashesi Venture Accelerator. If they decide that they are not interested in pursuing the venture, the team will be assisted in exiting the simulation, resolving inventory and closing the books.

BUSA 210 Financial Accounting
Required for all BA majors
Prerequisite: none
Offered: Fall or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This is an introductory accounting course that exposes students to fundamental accounting principles, the regulatory framework of accounting practice, elements of financial statements, the mechanics of data entry, preparation of financial statements, financial statement analysis, control accounts and reconciliations, and ethics in the accounting profession. The course is designed to provide students with the requisite skills for analyzing transactions, opening and maintaining proper books of accounts, doing basic reconciliations, preparing financial statements for sole proprietorships, applying fundamental accounting principles and ethical codes in solving accounting and business problems, and evaluating the financial performance of a business entity using financial statement analysis

BUSA 220 Introduction to Finance
Required for all BA majors
Prerequisite: Financial Accounting

Offered: Spring or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This is an introductory course aimed at equipping students with the basic skills of corporate finance. In this course, students will be introduced to some fundamental principles of corporate finance such as time value of money and risk. Specific areas of concentration include the time value of money, investment valuation and decision making under conditions of certainty and uncertainty, working capital management, capital budgeting, cost of capital, capital structure and dividend policy, and intermediate and long-term financing.

BUSA 224 Finance for non-Finance
Required for all MIS & CS majors

Prerequisite: Pre-calculus 1 & 2 or Calculus 1; *Prior or concurrent enrolment in Microeconomics*
Offered: Spring & Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course is designed to equip students with the necessary tools, skills and competencies required of contemporary managers of top-notch organizations to properly handle financial management and planning issues. It is a platitude that almost every activity in an organization has some monetary implications, hence may translate into numbers. Managers must therefore be trained to know how their actions and inactions affects the numbers, which in turn affect the entity's profitability; a critical ingredient necessary for the long-term survival of the business.

The course is organized under four main thematic areas – ***understanding the business, tax, and finance environments; understanding financial statements; effective cost management and planning; and effective financial decision-making***. Materials for the course will be delivered through lectures and class presentations of relevant cases, which draw on specific concepts discussed to enhance students' understanding.

BUSA 304 Operations Management
Required for all BA majors
Prerequisite: Quantitative Methods or Statistics for Engineering & Economics
Offered: Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The study of Operations Management this spring semester will take you on a journey of the principles, strategies and tools required to manage any part of an Organization that is involved in the provision of goods and or services

The activities involved in the transformation of a need of a product and or service into the actual product or service is an intriguing process which covers a huge part of a typical organization.
The transformation process offers a lot of opportunities for achieving competitive advantage and the manager of any part of the process or at any strategic level in an Organization needs to understand how the various processes fit together, what the implications are for the weakest part of the process, identify opportunities for continuous improvement and also see from a bird's eye view, the approach leadership must take to ensure profitability, growth, continuous improvement, development of employees and sustainability.

While looking out for all the above factors, there is also the issue of ensuring that the organization, institution or company is here for the long haul through a consistent review of sustainability requirements.

BUSA 311 Managerial Accounting
Required for all BA & MIS majors
Prerequisite: Financial Accounting or Finance for non-Finance Managers
Offered: Spring or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Students will learn how to use financial information to identify and analyse alternative projects to be undertaken by the entity in order to optimize profitability. They will develop the critical analytical skills necessary for identifying and using relevant costs and related issues, which form the bedrock for cost-effective managerial decision making.

BUSA 321 Investments
Required for all BA majors
Prerequisite: Introduction to Finance or Finance for non-Finance Managers
Offered: Fall or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course surveys the investment media, concepts and techniques to provide an understanding of the investment process in the economic and financial environment. The course covers the elements of investments, portfolio theory and management, security analysis, valuation of stocks and bonds, and risk-return trade-off. The course entails only the necessary mathematical and technical details which will provide the intuition that may illuminate the gliding path for students as they confront new ideas and challenges in their later lives as investment practitioners. On the conviction that theories such as the capital asset pricing model and the efficient market hypothesis are intellectually satisfying subjects of scientific research as they are important building blocks for the development of solid grounding in investments, aspects of these theories will be used generously to determine the value of real and financial assets. As the instructor tries to bridge the gap between theory and practice, several real-world examples are presented. The course will consist of lectures and discussions of contemporary investment and finance challenges and developments in Ghana and across the globe. In particular, students will be exposed to trends in socially responsible investing around the globe and what lessons Ghanaian Fund Managers can take. A good dose of data will be used in the 'analysis' part of the course. Students will be required to use Microsoft Excel analytic tools to solve a large part of the problem sets. This is also intended to provide students with a taste of tools they will need to understand and use in their career as investment analysts.

BUSA 341 Marketing
Required for all BA majors.
Prerequisite: Micro-economics
Offered: Spring
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Marketing is a key driver of success in today's dynamic organizations. This course will give you an insight into marketing concepts and tools and how these are applied to deliver results.
The essential or big question this course seeks to answer is "How do organizations especially private, for-profit enterprises create value for customers, clients or stakeholders while achieving the objectives of the organizations in a dynamic, digitized business environment?"
Students will be exposed to and given the opportunity to apply foundational knowledge of marketing concepts, principles and skills that thriving firms or organizations use to undertake the following critical marketing tasks:

Understand consumer needs and wants as well as identify opportunities and threats in the marketplace

Decide which target markets to serve best

Develop a compelling value proposition by which the firm can grow and win in the marketplace

Craft an integrated marketing plan to deliver superior value, appeal to customers, build lasting relationship with target customers and deliver sustainable profitable returns to the organization
Students are expected at the end of the course to demonstrate the strategic marketing management skills of **understanding** customer preferences, **designing** relevant products and service **value proposition** to meet the needs of selected customers and determining appropriate means of **communicating**, **delivering** and **capturing** value for customers and the firm respectively.

BUSA 350 International Trade & Policy
Required for all BA majors
Prerequisite: Pre-calculus 1; Micro-economics; Macro-economics; Statistics
Offered: Spring
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The course is designed to introduce students to the main concepts and methods of international trade using applications drawn from the real world. Throughout the course, we would convey the major ideas that have emerged from recent research while emphasizing the continued importance of the old theories.
Throughout this course, the objective is to guide students to understand how the evolution of international economic theory has helped shape our understanding of a rapidly changing global economy. Also, how we can use the knowledge about international trade to contribute to the on-going debate about trade protection, free trade, regionalism and trade preferences among other issues.

BUSA 400A_B Thesis 1 & 2

Capstone option for BA, MIS, CS
Prerequisite: 8 Credits in Major Area of Study
Offered: Fall
Course Type: Seminar
Credit Hours: 4; Ashesi Credit Units: 1; Seminar hours per week classroom: 1.5; Hours per week discussion: n/a

Send an e-mail to searmah@ashesi.edu.gh if you need further information on the BA Thesis capstone process.

BUSA 401_A Entrepreneurship 1
Capstone option for BA, MIS, CS
Prerequisite: 8 Credits in Major Area of Study
Offered: Fall
Course Type: Seminar, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Entrepreneurship has been held by many as the key to development in the underdeveloped world. This is because it holds the potential of aiding problem solving through the development of innovative products and services. These will also help in reducing unemployment by serving as income generation avenues for the youth. If Africa, and indeed other developing economies, can

achieve the Sustainable Development Goals (SDG), there will be the need to develop profit generating enterprises as well as social enterprises to serve as the backbone and propellant.
This capstone session, in a bid to further position Ashesi graduates to understand the nuances of start-ups and the entrepreneurial mindset to develop into entrepreneurs and intrapreneurs, integrates the skills and knowledge obtained from courses offered in the past three years of the student's education on campus. It will teach students what a start-up is and make the clear distinction between a start-up and a small business. It will take students through opportunity analysis and the development of sustainable business models using Eric Ries' *Lean StartUp*, Steve Blank's *Customer Development Process* and Alexander Osterwalder's *Business Model Canvas*.
The core teaching philosophy is experiential, learner-centric and inquiry-based to develop the mind-set, reflexes, agility and resilience an entrepreneur needs to search for certainty in the chaotic world of start-ups. This will be achieved with the adoption of several teaching aids and stress on the need to *get out of the classroom* to bring their businesses to life.

BUSA 401_B Entrepreneurship 2
Capstone option for BA, MIS, CS
Prerequisite: Entrepreneurship 1
Offered: Spring
Course Type: Seminar, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

Capstone Entrepreneurship II will aim to aid venture teams validate their business models by undertaking further customer and stakeholder engagements, as well as MVP tests. This will help the teams further validate their product-market fit and gain some early adopters/ earlyvangelists to patronize their products/ services and pay for them. Feedback from these earlyvangelists will inform further iterations and pivots. Venture teams will then be taken through the Customer Creation and Company Building aspects of the Customer Development process. These form the *execution* aspect of the Customer Development process. The student will look at their product/ service positioning considering the market type they are entering, and then plan to launch their venture or its product/ service. Due to time constraints, strategies for reaching mainstream customers and company building, with a focus on structuring fast response departments will be put in place to aid in the executing this business model but will not be executed as a requirement of this session. Specifics include venture ownership, resource management, operations, and some management and cultural issues.

BUSA 402 Business Law
Required for all BA majors
Prerequisite: none
Offered: Fall
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The goal of the course is to familiarize students with the legal environment within which business is conducted in Ghana and Internationally.
It is recognized that students undertaking this course are not being trained to be lawyers. However, the basis of all business activity is underlined by rules and regulations and for that matter laws.
It is therefore essential that a student of business law appreciates rudiments or has a basic understanding of the legal framework governing businesses in Ghana.

BUSA 405 Competitive Strategy

Required for all BA & MIS majors
Prerequisite: Introduction to Finance or Finance for non-Finance Managers; Macroeconomics; Prior or concurrent enrolment in Marketing recommended but not required.
Offered: Spring
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Organizations have always had to find ways of staying in business and more importantly thriving in their chosen markets. This requires the development, implementation and evaluation of business strategy. Competitive Strategy also known as business strategy is designed to establish a profitable and sustainable advantage and position for a business in a preferred marketplace.
Although knowledge from such disciplines as Marketing and Human Resource Management are important in managing a business, this course will focus on the role competition plays in business strategy development and implementation i.e. understanding the organization and competitive environment in which a firm operates, formulating long-term direction, determining how to position a business unit, as well create a sustainable competitive advantage within a competitive environment, mobilizing resources and developing capabilities to compete and assessing performance.

BUSA 410 Applied Project

Capstone option for BA, MIS, CS
Prerequisite: 8 Credits in Major Area of Study
Offered: Fall
Course Type: Seminar
Credit Hours: 4; Ashesi Credit Units: 1; Seminar hours per week classroom: 1.5; Hours per week discussion: n/a

The Applied Project is characterized by its engagement with a real-life organization. Ultimately, students are expected to integrate foundational knowledge and skills gained over time and use them to solve real-life challenges for existing organizations. The successful execution of an Applied Project requires skills sets including research and critical analysis; stakeholder engagement; project management; professionalism and communication.

The student must be committed to the three pillars of Ashesi, and as a true **scholar**, be able to apply rigorous research and analytical skills to a real-life challenge; as a **leader**, be able to demonstrate excellent self-leadership and problem-solving skills, all executed in a professional manner; as a good **citizen**, seek to help an organization to create value and contribute to the body of knowledge on the selected subject matter. Click here to view the applied project handbook. Send an email to kmorris@ashesi.edu.gh if you have any questions about the BA Applied Project.

BUSA 422 Corporate Finance

Required for all BA majors
Prerequisite: Investments
Offered: Spring & Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course covers numerous issues of practical relevance to the contemporary corporate finance manager. Although the central focus will be on how corporations make investment and financing decisions, the introductory classes will discuss households' saving and investment decision-making and how securities markets and financial intermediaries complement such efforts. Topics to be covered include risk and return, asset valuation, working capital management, mergers and acquisitions, and corporate restructuring. The course focuses on the application of corporate finance concepts to solving real life problems in a typical business environment. Students will learn

to appreciate how the timing of and uncertainty about future cash flows and their associated risks combine to determine the current value of those cash flows. It is expected that assignments, class projects, and discussions will provide the needed motivation and enhance students' understanding of the finance theories to be discussed. The numerous real-life examples and cases are aimed at equipping the students with skills to plug-and-play in a starting finance position in any organization in Ghana and abroad

BUSA 423 International Finance
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Introduction to Finance
Offered: Typically offered in the Spring
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

This is an introductory course aimed at equipping students with the basic skills of corporate finance. In this course, students will be introduced to some fundamental principles of corporate finance such as time value of money and risk. Specific areas of concentration include the time value of money, investment valuation and decision making under conditions of certainty and uncertainty, working capital management, capital budgeting, cost of capital, capital structure and dividend policy, and intermediate and long-term financing.

BUSA 430 Human Resource Management
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Organizational behavior
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The purpose of this course is to familiarize you with the basic principles and techniques of human resource management. The course takes a practical view that incorporates the contributions of the behavioral sciences with the technical aspects of implementing the HR function in the 'real world.'
Surely, not everyone who takes this course will become a human resource professional, although that individual will learn a great deal about those roles. However, all managers no matter what their specializations are, play essential roles in carrying out HR policies and practices in their organizations. Consequently, a basic understanding of human resource management (HRM) is essential wherever you find yourself in your world of work. The key objective of this course is to enable you learn that HRM is more than just accepting employment applications and keeping records. It is a central and strategic organizational activity of increasing complexity and importance.

BUSA 431 Real Estate Development
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Quantitative Methods or Statistics for Engineering & Economics

Offered: Typically offered in the Fall
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The real estate development course aims to introduce students to what real estate development (RED) is and what the development process entails. It seeks to provide students with a good overview of what goes into the various stages of the development process with emphasis on feasibility studies, financing and management.

This year, the class will undertake a feasibility study for a real-life client. This client needs a feasibility study conducted for a development they want to embark on. The outputs expected are a feasibility report and recommendations for financing and property management, post development. Students in the class will be split into teams to conduct the study, going through the 8-stages of the development process. They will do this as they are taken through the various stages of development process in the class, visit the site and also interact with professionals who will help them make development and investment decisions for the client. The bottom line is a development which is sustainable where its financial model is concerned, and one that is environmentally considerate.

BUSA441 Service Marketing

Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Marketing
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Services dominate the expanding world economy as never before, and technology continues to evolve in dramatic ways. New business models are taking over the old and one time famous companies. Competition is fierce due to costumers' ever-changing needs and expectations. In this course, you will learn how to make effective decisions in
marketing a service or in service business by learning and applying relevant concepts, principles, and theories. By the end of this course you will :

- Have an in – depth appreciation and understanding of the unique challenges inherent in managing and
- delivering quality services and developing competitive service strategies
- Grasp concepts, principles and theories that enable you to address these challenges
- Explain the framework for developing a service marketing strategy and apply this process to a specific
- business case.
- Appreciate the need for customer-service oriented mindset in doing business.

BUSA 442 Strategic Brand Management

Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Marketing and Text & Meaning; or Foundations of Design & Entrepreneurship II
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

The course is designed to develop students' marketing skills and understanding of brand management. In this course, you will learn how to make branding decisions, develop a strategic brand plan & manage brands by learning & applying relevant concepts, principles, & theories. By the end of this course, you should be able to:
Understand the strategic brand management process and role of brand management in achieving business success.
Have an in –depth appreciation and understanding of the important issues in planning, implementing and evaluating brand strategies
Grasp appropriate concepts, theories, models and other tools to make better branding decisions
Apply branding principles to cases and opportunities created by the course.
Develop brand positioning, strategic brand plans and integrated marketing communications plans to grow brands.

BUSA 444 Supply Chain Management
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Quantitative Methods; or Statistics for Engineering & Principles of Economics
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

This course presents the fundamental concepts and tools needed to understand how Supply Chains work. The content spans the typical scope of supply chains: Plan, Source, Make, Deliver and Sell set in today's global market in which there is fierce competition, more frequent innovations and more sophisticated and demanding customers/consumers. Continuous advances in technology also provide a wide variety of continuous improvement options in supply chains. The interactions of the factors and levels of supply chains are explored for optimization and efficiency in Supply Management, Inventory Management, Product & Production Management, Distribution and Transportation Management.
The Course also covers the Responsible Sourcing and the Key Performance Indices that are used to determine service levels and efficiencies in supply chains.

BUSA 451 Development Economics
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Micro-economics or Macro-Economics or Principles of Economics; and Statistics
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

This course discusses the problems of Least Developed Countries (LDCs) and Middle-Income countries (especially in Africa, Asia and Latin America) and their efforts to improve the lives and well-being of their people. It incorporates different aspects of the development process including traditional development topics like economic growth; education; population studies; rural-urban migration and poverty studies as well as less traditional but equally pertinent topics like institutions; competition policy; foreign aid and corruption.
The principal objective of the course is to develop the student's ability to master and apply the tools of economic theory and analysis to contemporary challenges in economic development.

BUSA 452 Africa & the Oil Industry
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Micro-economics or Macro-economics or Principles of Economics; and Statistics
Offered: Typically offered in the Spring
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The course will introduce students to the history of the global oil industry, the emergence of the oil industry in Africa, how colonization influenced the process, the economic and environmental ramification of Africa's oil dependence, and the link of the oil industry to corruption and development in Africa. Policy related issues as to how the oil sector can be optimized to more effectively catalyze the economies of Africa will be discussed, using Ghana and other African countries as case studies.

ECON 101 Micro-Economics
Required for all BA, MIS Majors. CS & ENG majors can substitute Principles of Economics with this course.

Prerequisite: Pre-Calculus 2 or Calculus 1
Offered: Fall or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
The aim of the course is to introduce students to the fundamental principles, ideas, theories and tools of microeconomic theory. At the end of the course students should have achieved some understanding of and gained competence in using economic ideas, tools and procedures.

ECON 102 Macro-Economics
Required for all BA & MIS majors
Prerequisite: Pre-Calculus 2 or Calculus 1
Offered: Spring or Summer
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
This course is an introduction to macroeconomics, with a strong emphasis on policy implications. The course has two objectives. Firstly, it will develop simple models of goods and services, assets, capital and money markets which can be usefully applied to generate realistic predictions regarding the behaviour of macroeconomic variables such as: output; employment; inflation; the current account; and interest and exchange rates. Secondly, the course will teach students to use these models to understand and interpret current and historical macroeconomic developments. Current macroeconomic developments and policy changes such as the financial and banking crisis, inflation targeting, austerity measures, deficit financing among others will be discussed.

ECON 452 Econometrics
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Micro-economics or Macro-Economics or Principles of Economics; and Statistics and Quantitative Methods (Multi Variable Calculus can replace Quant Methods as a pre-requisite for this class)
Offered: Typically offered in the Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

The aims of the course is to (i) introduce students to techniques for performing statistical analysis on quantitative data focusing on the estimation of the regression model (ii) help students solve problems commonly encountered in estimating statistical models like the regression model, and (iii) teach students to interpret the estimates from such models and (iv) enable students to be able to perform quantitative analysis using secondary data.

ECON 455 Managerial Economics
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: Calculus 2 or Applied Calculus; Micro-economics; Macro-economics; Statistics or Econometrics
Offered: Typically offered in the Spring
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

Managerial Economics is the study of the different ways in which economic principles and quantitative tools can be employed to assist managers to make effective decisions. It provides principles to foster the goals of the organization, as well as a better understanding of the external business environment in which an organization operates. The course enhances students'

understanding of how markets operate and develops their capability to make economic predictions about market outcomes

SOAN 325 Research Methods
Required for all BA, MIS & CS Majors
Prerequisite: Statistics
Offered: Fall
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

The course is designed to provide the student with broad fundamentals of research methods. To this end, students will be introduced to quantitative, qualitative and mixed methods approaches for conducting research. Students will be guided through the various stages of conducting research; i.e. writing research proposals, where they will identify problems to study; collecting information by conducting appropriate literature review; collecting appropriate primary and/or secondary data; analyzing data; writing mini reports; and critiquing published articles. Class time will be devoted to lectures, data analysis and in-class assignments. The course is hands-on, using R as the main software.

Social Enterprise
Major Elective for BA, MIS. Non-Major Elective for ENG and CS
Prerequisite: FDE, Micro-Economics
Other courses that complement this course include Marketing; Corporate Finance; Operations Management; Competitive Strategy; Investments; Economic Development; Branding; New Product Development; Strategic Brand Management; and *Service Marketing.*
Offered: Typically offered in the Spring
Course Type: Lecture, Experiential
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1
Social Enterprise, is an exploratory business elective offered by the business administration department that challenges the student to think in ways that produce sustainable and profitable outcomes that lead to social or environmental impact. Through various team challenges, assessments, and meet the leader sessions students have the opportunity to discuss, examine, and transfer thought into action as they work together to come up with their own solutions for some of their world's toughest challenges.

Computer Science

CS221 Discrete Structures and Theory
Prerequisites: Pre-Calculus 2 or Calculus 1, Introduction to Computing & Information Systems OR Computer Programming for CS OR Computer Programming for Engineering
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course is designed to give students in Computer Science the mathematical foundations they need for their future studies. Specifically, you will learn:

- Mathematical reasoning: how to think logically and mathematically? Understanding and constructing proofs.
- Combinatorial analysis: to be a problem solver, it is important to be able to count objects. We will see some basic techniques for counting.

- Discrete structures: of course, as the name of the course suggests, you will also learn how to manipulate discrete structures (sets, permutations, relations, graphs…)
- Algorithmic thinking: sometimes, we will solve a problem by specifying a list of steps to follow (an algorithm). Algorithms can be implemented through computer programs. By the end of this course, you will know how to describe algorithms (in both English and pseudocode), verify that they work properly, analyze the computer memory and time required to implement them.
- Applications and modeling: applications to show the relevance and practicality of mathematics. We will see applications of discrete mathematics to computer science, data networking and biology. An important problem-solving skill is the construction of mathematical models. We will build our own models while solving some of the exercises.

CS222 Data Structures & Algorithms

Prerequisites: C or better in EITHER Computer Programming for CS OR Computer Programming for Engineering; Concurrent enrolment in Discrete Structures and Theory recommended but not required
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course is about data structures; that is the methods of organising large amounts of data. It is also about algorithm analysis; that is, the estimation of the running time of algorithms. Specifically, this course will cover fundamental abstract data types and their implementations as data structures, such as lists, hash tables, trees, priority queues, and graphs, as well as asymptotic analyses of algorithms involving these data structures. Students will also learn about recursion, searching (sequential and binary); and sorting (selection sort, insertion sort, merge sort, and heap sort). The Java programming language will be used as the language of implementation in this course, and so Eclipse or IntelliJ will be the recommended development environments.
Course Objectives: At the end of this course, students will be able to:

- Analyze and compute the running time of algorithms, expressing these runtimes using asymptotic notation (Big-O)
- Explain and implement a variety of linear and non-linear data structures.
- Explain and implement fundamental algorithms for searching and sorting.
- Identify and apply appropriate data structures for the solution of practical problems.

CS313 Intermediate Computer Programming

Prerequisites: EITHER Computer Programming for CS OR Computer Programming for Engineering
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1
Course Description: This course is a continuation of Computer Programming for CS. It will introduce students to more details of object definition and construction and event-driven programming. It will also introduce additional standard Java packages, including the file system and graphical user interface elements. This course will also give students an introduction to C++. Good software engineering practices will be featured in various aspects of the course, and notations like the Unified Modeling Language (UML) will be employed. Through one or more team projects, students will gain experience in designing and implementing larger systems. However, the emphasis of the course will be on the use of prewritten packages and built-in language facilities, as well as design and implementation of moderately sized custom classes and algorithms, rather than on the design of whole systems.

CS 314 Human Computer Interactions

Prerequisites: Introduction to Computing & Information Systems OR Computer Programming for CS OR Computer Programming for Engineering
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course is an introduction to Human Computer Interaction (HCI), a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. The course considers the inherently multi- and interdisciplinary nature of HCI and situates various HCI issues in the organizational and societal contexts. It introduces theories of human psychology, principles of computer systems and user interfaces designs, a methodology of developing effective HCI for information systems, and issues involved in using technologies for different purposes.
Learning Objectives: At the end of this course, the student should be able to:

- Explain HCI and interaction design to non-experts
- Describe cognitive foundations of HCI and user centered design process
- Gather and understand user requirements
- Design and evaluate UI of low and medium complexity
- Communicate effectively about design and evaluation
- Discuss some of the outstanding research problems in HCI.

CS331 Computer Organization and Architecture
Prerequisites: EITHER Computer Programming for CS OR Computer Programming for Engineering. Completion or concurrent enrollment in Discrete Structures and Theory.
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course presents the fundamental concepts of computer organization and instruction set architectures. Assembly language programming is used to present and illustrate the concepts of instruction set design. The basics of Central Processor Unit (CPU) design and implementation are covered, including some performance enhancing methods like pipelining and memory caches. The interface to the Compiler and Operating System is described in terms of the interaction between the hardware and software components of a system. The course discusses developments in modern computer system such as parallel processing, virtual computing and other new architectures.
Course Objectives:

- Learn digital system design process
- Understanding of modern computer architecture
- Understand Software-Hardware interface
- Understand low level programming and program execution

CS341 Web Technologies
Prerequisites: Computer Programming for CS OR Computer Programming for Engineering, Completion or concurrent enrollment in Database Systems
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course introduces World Wide Web Consortium (W3C) standard markup language and services of the Internet. Topics covered will include basic and advanced HTML, scripting and actives pages, design and active pages, design and developing Web-based applications, principles and tools for Web content creation, database fundamentals for the Web, Web management, and Web service delivery. The primary goal of this course is to introduce the relevant technologies and skills needed to design, develop, deploy and manage effective Web Applications.

To achieve this goal, we will use a set of 'programming languages': HTML, CSS, JavaScript (AJAX, jQuery, Frameworks or Libraries), PHP, MySQL (relational database management system) and Content Management Systems (CMS).

CS415 Software Engineering

Prerequisites: EITHER Computer Programming for CS OR Computer Programming for Engineering, EITHER Web Technologies OR Intermediate Computer Programming OR Data Structures
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course will introduce a collection of methods which embody an "engineering" approach (i.e. scientific method) to the development of computer software. The content starts with development lifecycle models, such as waterfall, agile development, etc. and then continues to cover requirements specification, the Unified Modelling Language (UML), software architecture, object-oriented analysis and design, design patterns and testing.
Software engineering is an inherently practical subject and applying the concepts being taught is a vital component of developing expertise in this area. Consequently, students undertake a substantial group project, working through a number of stages of the development of a (larger) software application. Students will be supervised but will be expected to largely organize themselves and their work, learning key transferrable skills in management and organization.
Learning Objectives

- Appreciate the wider engineering issues that form the background to developing complex and evolving software-intensive systems.
- To understand principles, concepts, methods, and techniques of the software engineering approach to producing quality software.
- To organize and manage a medium-sized software development project, including project plans and documentation, and schedule.
- To make effective technical oral and written presentations.
- Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
- Employ group working skills including general organization, planning and time management and inter-group negotiation.
- Capture, document and analyze requirements.
- Translate a requirements specification into an implementable design, following a structured and organized process.
- Make effective use of UML, along with design strategies such as defining a software architecture, separation of concerns and design patterns.
- Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.
- To think critically about ethical and social issues in software engineering.

CS424 Advanced Database Systems

Prerequisites: Database Systems, EITHER Discrete Structures and Theory OR Data Structures and Algorithms
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: Advanced Database Management Systems course deals with the usage as well as concepts of design and architecture of databases. In covering the concepts, theorems and algorithms, proofs relevant to different aspects (design, architecture and implementation) are covered. The general approach is go through design, architecture (schema, indexes and storage),

core features (transactions, concurrency), and specialized database usage (data-mining & data-warehousing). The practical work done in the course goes through usage of some advanced SQL features and the implementation of some algorithms and coding of internals of an actual database system.
Students should already know structured query language. The course will build further on this to include concepts such as union types and predicates. The diagram format for design may change a bit but it provides students more expressivity for their designs.
Course Objectives:
To be competent with conceptual and logical database design

- To be able to setup and configure Enterprise DBMS
- To be able to create and use database objects such as tables, views, stored procedures, functions, indexes, constraints and triggers
- To be able to design and develop a holistic and efficient database for any system
- To be able to modify data with logical query processing
- To be able to troubleshoot and optimize database using tools to analyze query performance

CS435 Operating Systems

Prerequisites: EITHER Computer Programming for CS OR Computer Programming for Engineering, EITHER Discrete Structures and Theory OR Data Structures and Algorithms
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This is a course on theory and practices of operating system design and implementation. Operating Systems are found in most computing devices we use (e.g. mobile phones, tablets, laptops, televisions, cloud); some are embedded, some are general purpose or specialized –anywhere you find computing, you will find an operating system. All operating systems deal in some way or another with users, security, resources, storage and memory, threads and processes, scheduling, as well as policies associated with or built on these. Our course covers an overview of operating systems, processes, memory, I/O management, file systems and some case studies.
Course Objectives: Upon completion of this course, the students should be able to

- Explain the concepts, structures and mechanisms of modern operating systems.
- Design a concurrent system without deadlock.
- Write concurrent programs using multiple threads and processes.
- Describe process execution using various CPU scheduling algorithms.

CS442 E-Commerce

Required for MIS, Elective for CS
Prerequisites: Database Management Systems and Web Technologies
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 4

This is an introduction to e-Commerce principles, technologies and applications. This course also develops understanding of the problems and requirements of Internet business, and the corresponding solutions. Protocols to ensure secure transactions and e-commerce protocols based on encryption techniques will also be studied. Legal and ethical issues will be discussed, as well as marketing and revenue models for online businesses. Students will get hands on experience building a secure ecommerce site
Course objectives:

- Students will be able to build ecommerce application that is secure and uses best practices.
- Students will understand the legal and ethical issues involved in e-commerce.

- Students will understand infrastructure and technology options for setting up an ecommerce site, and will have experience deploying some of them.
- Students will be able to determine appropriate revenue models for an online business

CS452 Machine Learning

Prerequisites: Computer Programming for CS OR Computer Programming for Engineering, Multivariable Calculus & Linear Algebra

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course introduces machine learning. Topics include supervised and unsupervised machine learning, statistical inference and prediction. A wide variety of algorithms will be presented, including logistic regression, K-nearest neighbors, naïve Bayes, decision trees, neural networks, K-means, mixtures of Gaussians, principal components analysis, Expectation Maximization. The course will also discuss modern applications of machine learning such as image segmentation and categorization, speech recognition, and text analysis.

Course Objectives:

1. To understand and be able to explain the foundational principles underlying the field of machine learning
2. To be able to implement algorithms for regression, classification, clustering and dimensionality reduction
3. To be able to design suitable machine learning models for a given real-world problem.
4. To be able to read and understand machine learning research papers.
5. To be able to give presentations on machine learning work to technical and non-technical audiences.

CS 453 Robotics

Prerequisites: EITHER Computer Programming for CS OR Computer Programming for Engineering; EITHER Calculus II OR Applied Calculus

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course gives a practical hands-on as well as theoretical introduction to robotics as a field that integrates expertise in Computer Science, Engineering, Design and Mathematics to create innovative systems that interact with and can operate autonomously or semi-autonomously in the physical world. In this course, students will work individually and in groups to implement robotics projects using robotics platforms such as the Lego EV3 kits, the TurtleBot robot, Interbotix robot arm, among others.

Course Objectives: To understand and be able to explain the foundational principles underlying the field of robotics.

- To be able to integrate sensors, actuators, and software into a robot designed to undertake some task.
- To be able to implement algorithms for planning and other functionality on robots
- To be able to read and understand robotics research papers
- To be able to give presentations on robotics work to technical and non-technical audiences.

CS458 Internet of Things

Prerequisites: Computer Programming for CS OR Computer Programming for Engineering

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

The Internet of Things (IoT) course takes an end-to-end view of IoT including the devices, networks, data analytics, programming, security, and business. It exposes the student to all aspects of a functional IoT system and how to design a secure, robust and scalable IoT network, taking on a hands-on approach. Labs and small projects will be used to gain understanding of key concepts at the various layers. Key among these are the devices, network protocols, data and programming aspects. Students will review hardware types and software tools and be introduced to IoT design principles which cover how to transition from an IoT idea to an IoT product, building of prototypes and commercializing them. Since IoT is still emerging, businesses are going to be either adopting IoT solutions or transforming their existing businesses to include IoT in a seamless and sustainable manner. The course addresses these aspects as well, in order to prepare participants to lead in this budding industry in the business segment.

CS459 Natural Language Processing

Prerequisites: Computer Programming for CS OR Computer Programming for Engineering
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course seeks to introduce students to basic and foundational concepts in natural language processing. The course will use three NLP tasks – sentiment analysis, machine translation and conversational systems – to concretize these concepts. The course will be project based and students will be expected to draw connections between the concepts they learn and the projects they are assigned. Students will be expected to communicate their thought process and solutions. It won't be enough to write code that 'works': students must show they know and understand what they are doing.
Course Objectives:

- To understand basic and foundational concepts in language processing.
- To understand what goes into developing sentiment analysis programs, conversational agents and machine translation systems.
- To be able to write sophisticated programs to perform sentiment analysis.
- To think through and develop ideas and resources for translation systems for native African languages.
- To be able to read, understand and apply selected research papers in NLP.
- To be able to give presentations on NLP work to technical and non-technical audiences.

IS331 IT Infrastructure

Prerequisites: Computer Programming for CS OR Computer Programming for Engineering
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course introduces IT Infrastructure as a shared technology resource for students majoring in Management Information Systems. It covers topics related to both computer and systems architecture and communication networks, with an overall focus on the services and capabilities that IT Infrastructure solutions enable in an organizational context. It gives the students the knowledge and skills that they need for communicating effectively with professionals whose special focus is on hardware and systems software technology and for designing organizational processes and software solutions that require in-depth understanding of the IT Infrastructure capabilities and limitations. The course focuses strongly on Internet-based solutions, computer and network security, business continuity, and the role of Infrastructure in regulatory compliance.
Course Objectives: Upon completion of this course, the students should be able to.

- Understand the principles underlying layered systems architectures and their application to both computers and networks.

- Understand the differences and similarities between the core elements of an IT Infrastructure solution, such as clients, servers, network devices, wired and wireless network links, systems software, and specialized security devices.
- Understand how IT Infrastructure components are organized into Infrastructure solutions in different organizational environments.
- Understand through practical examples how protocols are used to enable communication between computing devices connected to each other

IS332 System Administration Lab

Prerequisites: Computer Programming for CS OR Computer Programming for Engineering; Prior or concurrent enrolment in IT Infrastructure, Operating Systems or Networks and Data Communications is recommended

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course builds on the theory and practice developed in the IT Infrastructure course, with in-depth experience in configuring and administering IT infrastructure, particularly operating systems, networks, network devices, and security solutions. It provides both conceptual knowledge and practical experience. It also prepares the students for organizational roles that require interaction with external vendors of IT infrastructure components and solutions. Topics of discussions, assignments and lecture time shall include, but not limited to server architectures, authentication and security, network services including firewalls, storage services, performance analysis and tuning, management and configuration of services and system resources, system initialization, cross-platform services, policies and procedures.

Course Objectives: After successful completion of this course, students will be able to:

- Configure an IT infrastructure solution for a small organization, including a network based on standard technology components, servers, security devices, and several different types of computing clients.
- Identify potential sources of poor computer performance and evaluate potential solutions
- Evaluate alternative policies and mechanisms for providing reliability features of computer system services and operations
- Apply the core concepts underlying IP networks to solve simple network design problems, including IP planning.
- Configure simple infrastructure security solutions.
- Negotiate with vendors providing design and implementation solutions.
- Cloud Computing

IS451 Information and Systems Security

Prerequisites: Discrete Structures; Computer Programming for CS OR Computer Programming for Engineering

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

COURSE DESCRIPTION: Information security mechanism is one of the most crucial factors for any organization. Important assets of organization demand a proper risk management and threat model for security hence, information and systems security concepts are gaining a lot of traction. This course will initially cover the concept of information and systems security and software installations process. It will then move on to modules such as threat modelling, risk management and mitigation.

This Course covers the network as well as web scanning. Later in the course it teaches how to use Kali Linux for ethical hacking, it will have different practical on using Kali Linux such as for information gathering, vulnerability analysis, web application analysis, database assessment and password attacks and have some hands-on experience. It will also cover concepts of incident response system, information rights management and so on. It will then guide you towards building your own information security framework best fit for an organization. At the end of this course, you will be well versed with all the factors involved with information security which would help you build a security framework which will be perfect fit for an organizational requirement.

Mathematics Track – **Mathematics courses taken by various majors at Ashesi are housed in the Computer Science Department**

MATH101 College Algebra

Prerequisites: None

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: The goal of this course is to help freshmen develop a good knowledge of basic mathematical principles. Because the best way to learn mathematics is to do mathematics, classes will include a lot of meaningful activities through which students will build mathematical intuition, effective problem-solving skills, and discover real-world applications of mathematics.

MATH121 Pre-Calculus 1

Prerequisites: None

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: One definition of mathematics is the science of patterns. Patterns are all around us and the human brain is wired to recognize them. Pre-calculus uses the formal concept of functions to identify and describe patterns found in data, patterns expressed as a formula, and patterns identified visually in a graph. The emphasis of the course is on developing a conceptual understanding of the definition of a function, the characteristics of important function families, connections to real life, and how the study of functions facilitates the understanding of calculus. A focus on problem solving strategies, such as drawing diagrams, systematic lists, looking for patterns, matrix logic, unit analysis, estimation, and others, further develop students' skills in quantitative reasoning.

MATH122 Pre-Calculus 2

Prerequisites: Pre-Calculus 1

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: One definition of mathematics is the science of patterns. Patterns are all around us and the human brain is wired to recognize them. Pre-calculus uses the formal concept of function is to identify and describe patterns found in data, patterns expressed as a formula, and patterns identified visually in a graph. The emphasis of the course is on developing a conceptual understanding of the definition of a function, the characteristics of important function families,

connections to real life, and how the study of functions facilitates the understanding of calculus. A focus on problem solving strategies, such as drawing diagrams, systematic lists, looking for patterns, matrix logic, unit analysis, estimation, and others, further develop students' skills in quantitative reasoning.

Students Learning outcomes

- Mastery of algebra fundamentals.
- Conceptual understanding of functions, including the linear, polynomial, rational, radical, exponential, logarithmic, periodic and related function families, their applications and various forms of representation, such as graphic, symbolic, and tabular forms.
- Ability to apply a problem solving heuristic and appropriate strategies to a wide range of novel and challenging application, logic and quantitative reasoning problems, and present solutions using proper notation and clear communication.

Instructional Objectives

- Content will be presented in a clear and intuitive way using a variety of activities and applications to deepen student understanding and appreciation of functions.

MATH141 Calculus 1

Prerequisites: None

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course seeks to equip students with intuitive idea of limit. We will discuss continuity and the derivative of a function. Rules of differentiation would be examined and applied. The derivative of the elementary and transcendental functions would be discussed. We would apply the taught theoretical concepts to solve real-life problems.

Course Objectives: The course is expected to expose students to fundamentals of calculus.

MATH152 Statistics for Engineers

Pre-requisites: Engineering Calculus

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

COURSE DESCRIPTION: This course is a calculus-based, mathematical introduction to the fundamental principles of probability theory, statistics, and applications. Topics include descriptive measures, the axioms and properties of probability, combinatorial analysis used in computing probabilities, conditional probability, independence of events, sampling theory, discrete and continuous random variables, the standard distributions, estimation and hypothesis testing, analysis of variance, regression and correlation, expected value and variance, joint distributions, distributions of a function of a random variable, and sampling distributions. Also included are theoretical results such as Bayes Theorem, Central Limit Theorem, Law of Large Numbers, the Empirical Rule, Hypothesis Testing and Confidence intervals at least for a single mean and a single proportion. Programming in R or a similar language will be used to gain experience with statistical analysis in practice.

MATH 161 Engineering Calculus

Required for CE,EE and ME students

Pre-requisites: none

This course equips students with knowledge of differential and Integral Calculus which is fundamental to the field of Engineering. The focus is three dimensional: Concepts, Methods and

Applications. Technology such as graphing utility and Geogebra will be used to aid concept building and solution process.

MATH211 Multivariable Calculus & Linear Algebra

Prerequisites:
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: Physical problems require problem solving approaches which combine mathematical thinking and technology to develop modern solutions. Linear algebra and multivariable calculus is a course which provide the essential and foundational toolkit needed to approach such real-life problems. In this course, you will build on your existing differentiation and integration of single variable studied in prerequisite courses expand into multivariable calculus and linear algebra. Students will learn how to solve variety of equations in multi-dimensional spaces well as study how to manipulate linear equations and vectors to solve some engineering problems.

MATH221 Statistics with Probability

Prerequisites: Pre-Calculus 2 or Calculus 1
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: What influences consumer choices? Why are some people healthier, academically more successful, or more athletic than others? Are you interested in understanding how climate change is impacting communities in your home country? How can the vast amount of data collected and stored online be used to improve our quality of life? The discipline of statistics seeks to turn data into useful information that can help answer these and many other questions that may pique your interest. In this course, learning statistics will be motivated by using real data to answer questions that YOU are passionate about. Each student will: (1) generate a testable hypothesis from real data; (2) understand how large datasets are structured; (3) format and manage data; (4) conduct descriptive and inferential statistical analysis; and (5) communicate the results of their research to expert and novice audiences. The process of converting data into useful information draws on the following statistical foundation skills taught in the course:

- Producing data
- Exploratory data analysis
- Probability
- Inference

Statistical computing software is the essential tool that ties the quantitative research process together. In this course, you will use R and R Studio to manage data, carry out statistical analysis, conduct simulations, and create graphs and charts to represent data visually – all in the service of answering your own interesting research question!

MATH233 Quantitative Methods

Prerequisites: Pre-Calculus 2 or Calculus 2 AND Statistics or Statistics for Engineering & Economics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course will survey quantitative approaches to work in the business world. The course introduces students to concepts, techniques and software with which all successful managers
should be familiar. The course has three main components: operation research/management science, project management, and statistics.

The course is hands-on, using spreadsheet techniques with minimal reference to complex or abstract mathematics and the R software. The statistical tests will be useful in nearly any senior project work, as well as any significant quantitative decision making in a business context.

Objectives:

1. To develop analytical and conceptual thinking skills;
2. To practice logical approaches to problem-solving;
3. To develop algebraic and spreadsheet modelling skills; and
4. To be able to use the R software in solving statistical problems

Learning outcomes

Upon successful completion of the course, students will be expected to:

1. Apply some commonly used Operational Research/Management Science (OR/MS) techniques;
2. Construct algebraic and spreadsheet models to inform business decisions;
3. Identify data requirements for typical OR/MS methods;
4. Implement models in Excel and interpret solutions from a managerial perspective;
5. Use the R software to solve statistical problems in multiple linear regression, time series analysis, binary logistic regression, etc.
6. Present a persuasive argument to peers about a business decision based on a mathematical model using appropriate data.

MATH 251 Differential Equations & Numerical Methods

Prerequisites: Multivariable Calculus & Linear Algebra, Applied Programming for Engineering or Computer Programming for CS

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1

Course Description: This course will introduce students to the topics associated with differential equations and applied numerical methods in solving engineering problems. Student will learn how to translate engineering problems into differential equations, develop MATLAB models and investigate different numerical methods to find solutions.

Using software, students will learn how to solve differential equations, find roots of equations, the method of gradient descent, discrete and continuous optimization, and finding the solution of linear equations using numerical methods. Techniques will be applied in a series of projects focused on engineering applications.

Topics: Analytic differential equations and modeling of engineering problems using differential equations; first order differential equations, systems of two first order equations, second order linear equations; homogeneous linear equations, nonhomogeneous equations; the existence and uniqueness of a solution, approximation; numerical solutions of linear equations, Euler and Runge-Kutta methods; root finding, gradient descent, discrete and continuous optimization; the Laplace Transform and Inverse Laplace Transform.

Engineering Core

ENGR 112 Introduction to Engineering

Required of CE, EE, and ME students
Prerequisite: Foundations of Design & Entrepreneurship 1 & 2
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1
This course will introduce students to engineering by using practical problems and products from their surroundings. The course will challenge students to analyze the design and function of systems by using principles from different engineering fields including computer, electrical and electronic, and mechanical engineering. Students will study the contribution of material engineering, mechanical engineering, electrical and electronic engineering and computer engineering in making everyday objects, and the manufacturing processes needed for small and large scale production. Students will also critically evaluate selected products from diverse perspectives: design/usability/utility, energy/environmental view, recyclability/waste/breakage, etc., to begin the conversation of the engineering profession's responsibility and contribution to society.

Topics: Design for engineering, case studies, engineering drawing and presentations, manufacturing process and methods, computer integrated manufacturing, safety in engineering, environmental impact and sustainability, topics in the profession of engineering.

Practical Sessions: CAD drawing using AutoCAD, assembling and disassembling products, practical skills in operating lab and field equipment, safety drills, basic design and implementation projects.

ENGR 212 Instrumentation for Engineering

Required of CE, EE, and ME students
Prerequisite: Statistics for Engineering and Economics, Physics I: Mechanics, and Physics II: Electromagnetism
Credit Hours: 2; Ashesi Credit Units: 0.5; Hours per week classroom: 1; Hours per week lab: 2

This course continues the concept of measurement and measurement error that is introduced in the Physics sequence. Students study measurement systems, instruments, and measurement errors, and the use of probability and statistical analysis to design and execute experiments in the presence of measurement errors. An emphasis of the course is the design of instrumentation for experimental problem solving in real systems.

Topics: Survey of physical quantities typically measured, both physical and electrical. Analog signal conditioning for instrumentation. Measurement errors and implications on experimental design, planning, execution, and analysis. Parameters of sensors and transducers. Applications to process control and instrumentation (including pressure systems, temperature control, flow control, level control). Sensors appropriate to linear or angular acceleration, velocity, and position, DC and AC voltage, electrical resistance, capacitance or induction. DC null instrumentation such as Wheatstone Bridges.

Textbook: Robert Northrop, *Introduction to Instrumentation and Measurements, 2nd Edition*, CRC Press, 2005.

ENGR 300 Third Year Group Project and Seminar

Required of CE, EE, and ME students

Prerequisite: Leadership Seminar 4 for Engineers and System Dynamics, concurrent enrollment in Control Systems
Credit Hours: 2; Ashesi Credit Units: 0.5; Hours per week classroom: 1.5; Hours per week lab/discussion: 2 (or more hours independent work)

In their third year, engineering students will participate in a one-year group project that ideally cuts across multiple engineering fields (electrical and electronic, mechanical and computer), to revisit the design process at a higher level, to deepen teamwork skills, and to reinforce system level thinking. Part 1 of the third-year project is implemented through *Leadership 4 for Engineers*, which will address leadership, service learning, and responsibilities of the engineering profession to the community. Projects undertaken will include a service-learning component. Students will consider more than technical feasibility in their solutions, but also the desirability and sustainability of their solution to the community and the environment. In the course Third Year Group Project and Seminar, a weekly seminar that will facilitate group meetings and coordinate milestone completions, as well as provide a forum for discussion regarding professional issues and system level design. Students will also be required to reflect on their teamwork experiences, their own learning, and their completed group project, and present their project in a public forum. Learning objectives for the Third Year Group Project and Seminar include a maturing of design thinking and creative thinking skills, consideration of qualities such as environmental and societal impacts of their design, deepening of system-level thinking, project management experience, teamwork and communication skills development.

ENGR 311 System Dynamics

Required of CE, EE, and ME students
Prerequisites: Multivariable Calculus & Linear Algebra, Circuits & Electronics, Applied Programming for Engineers
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 2

Students will apply a broad range of mathematical tools to systems represented by linear, lumped-parameter models. Many physical domains are considered, including translating and/or rotating mechanical, electrical, thermal and fluid systems. Planar motion of rigid bodies will also be studied. Analysis techniques include both transfer function and state-space representations. Time and frequency domain analyses are included, along with a brief introduction to Control Theory. This course includes a laboratory.

Topics: Development of system equations in many engineering domains (mechanical, electrical and electromechanical systems, fluid and thermal systems); applications of linear algebra, Laplace transforms, and Fourier analysis methods to problems in many engineering domains; transient and frequency domain response of systems; transfer functions and state space representation of systems; importance of poles and zeroes of a system; vibrating systems. Time-domain and frequency-domain analyses of dynamic systems, time-domain analyses of control systems, frequency-domain analyses and the design of control systems.

Lab Exercises: MATLAB; measurement of physical systems, modeling and simulation of linear systems; accelerometer, thermal, and oscilloscope measurement and modeling.

ENGR 312 Control Systems

Required of CE, EE, and ME students
Prerequisite: System Dynamics
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 3

Students will model dynamic mechanical systems in planar motion, and use computer simulations to study them. Students build on the modeling and analysis techniques from System Dynamics to analyze and design controllers for linear systems. Practical examples from different engineering fields will be discussed. Students will analyze and design control systems in both continuous and discrete time, using both classical and modern techniques. Non-linear dynamic models are introduced.

Topics: Continuous and discrete time control; classical control – stability and design of systems using root locus and; modern control – state space and pole placement methods; models of physical systems (in the frequency and time domains), state-variable models, system responses (time response), control system characteristics, stability analysis (including Routh-Hurwitz criterion), steady-state errors. Root-Locus analysis and design, Nyquist/Bode methods, frequency-response analysis, frequency-response design, modern control design, discrete-time systems, also design via state space., sampled-data systems, analysis and design of digital control systems, discrete-time pole-assignment and state estimation, nonlinear system analysis, electro-mechanical actuators and sensors.

Lab Exercises: Simulation, measurement and design of dynamic systems using LabView and/or MATLAB/Simulink, analytical instrumentation, industrial process techniques and instrumentation, process control methods, calibration, detection sensors, programmable controllers.

ENGR 400 Senior Project 1 *(students do not officially register for this, however seminars are organized in Semester 1)*
Required of CE, EE, and ME students
Prerequisite: Third Year Project and concurrent enrollment in Project Management and Professional Practice
Credit Hours: 4; Hours per week classroom: 1 (meeting with advisor(s)); Hours per week lab: 6 (or more hours independent work)

In their final year, engineering students will undertake an individual or small group project (no more than 3 students) as a capstone experience to further their expertise in system level design, application, and the practice of the profession. These projects are supervised by faculty and sometimes by a professional from industry in addition to the faculty. The projects are designed to demand the application of skills the student has learned throughout the four years of the programme. Group projects are expected to cut across engineering disciplines and be more substantial in scope and effort than individual projects. One option for the senior project will be working with a corporate partner on a real-world engineering design and application project, called an *Ashesi-Corporate Project*. In these projects, students from different engineering majors and/or other disciplines (e.g. Computer Science, MIS, or Business) will work together on a project under the direction of both an Ashesi faculty member and a corporate partner, with funding provided by the corporate partner. Participation in Ashesi-Corporate Projects is competitive, and is not guaranteed.

Senior Project 1 runs concurrently with Project Management and Professional Practice, which will serve to guide the project management timeline of the project. In addition, students will meet with

their project supervisors regularly, and their project work will be assessed at the end of Senior Project 1.

Learning objectives include a maturation of design and system-level thinking, project management expertise, and a deep understanding of professional issues such as certification, professional boards and oversight, communication, ethics, and responsibility to employers, customers, society, and the environment.

ENGR 401 Senior Project and Seminar 2

Required of CE, EE, and ME students
Prerequisite: Senior Project 1
Credit Hours: 4; Hours per week classroom: 1.5 (seminar and meeting with advisor(s)); Hours per week lab: 6 (or more hours independent work)

This is a continuation of Senior Project 1. In Senior Project & Seminar 2, a one hour per week seminar provides a discussion forum for technical writing, ethics and social responsibility, and other topics, and will also serve to guide the project management timeline of the project. At the end of the senior project, students will write a summary of their work and do a public presentation of their work. To reinforce professional writing, each member of a senior group project will write-up their own supporting documents.

Learning objectives for the final year capstone project and seminar include a maturation of design and system-level thinking, project management expertise, and a deep understanding of professional issues such as certification, professional boards and oversight, communication, ethics, and responsibility to employers, customers, society, and the environment.

ENGR 413 Project Management and Professional Practice

Required of CE, EE, and ME students. BA/MIS students can enroll in this course as a Business Elective.
Prerequisite: Microeconomics or Principles of Economics, Leadership Seminar 4 for Engineers, and at least 6 Engineering courses
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

In this course students will learn to plan, strategize and execute an engineering project. The course will develop students' skills to manage projects and build on leadership skills and ethical reasoning they have acquired in core courses. Student will learn about environmental, safety and health issues that have to be considered during the implementation of a project. Students will also learn, discuss, and reflect on professional issues such as social responsibility, ethics, licensing, and regulatory reporting.

Topics: Project life cycle, feasibility study, planning, scheduling, cost estimation, resource allocation, budget management, monitoring and evaluation, logistics, management technology, managing project variables (including time management and quality management) professional, ethical, and health and safety issues. Introduction to Industrial Engineering (theory, practice, application), process management (labour, materials, overhead, risk management), work measurement, capacity utilization and constraints.

ENGR 414 Introduction to Environmental Science and Engineering
Elective for CE, EE, and ME students
Prerequisite: Concurrent enrollment in Thermodynamics
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 3

This course begins with a discussion of the local and global environment, environmental compartments and their relationship, pollution in these compartments, and basic descriptors. Systems analysis for environmental problems in areas such as water pollution, air pollution, solid and hazardous wastes, water and energy supply, and resource depletion are discussed, with an emphasis on the design of technological solutions. Students will work on projects in areas as varied as: renewable energy technologies, water quality, air quality, generators, increasing efficiency of appliances, urban planning, and cooking stoves.

Topics: Mass and energy transfer, environmental chemistry, mathematical modeling of growth, risk assessment, water pollution, water quality control, air pollution, global climate change, solid waste reduction, recycling, and management.

SC112 Physics I Mechanics
Required of CE, EE, and ME students Prerequisite: Calculus I (or Applied Calculus for non-Engineering majors)
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 3
This course is an introduction to classical mechanics and fundamental physics theories. The course will focus on motion of objects using basic kinematic and kinetic principles. At the end of the course, students will have a firm understanding and practical experience with the fundamental mechanics theories. Some topics introduced in this course will be expanded in other advanced courses, such as Introduction to Thermal and Fluid Dynamics, Thermodynamics, Heat and Thermal system and Dynamic Systems. Writing quality lab reports will also be emphasized.

SC113 Physics II Electromagnetism
Required of CE, EE, and ME students
Prerequisite: Physics I Mechanics
Credit hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 3
This course is an introduction to electrostatics, electrodynamics and electromagnetism. The basic principles behind electrical engineering and electronic communication will be discussed. At the end of the course students will understand simple electronic circuits and the fundamental theories and principles needed to continue their study of electronics and electrical systems. Writing quality lab reports will continue to be emphasized.

Computer Engineering Courses

CE 122 Applied Programming for Engineers
Required of CE, EE, and ME students
Prerequisite: Calculus 2 and Computer Programming (for Engineering or Computer Science)
Credit Hours: 2; Ashesi Credit Units: 0.5; Hours per week classroom: 1.5

This course will build on students' existing computer programming experience and teach students how to use computers to solve engineering problems. Students will use the modeling skills they have gained from their mathematics courses and apply it to develop engineering simulations. Students will gain experience in writing applications in languages commonly found in engineering,

such as C or Python. Students will also learn how real numbers are represented by computers, especially insofar as they affect precision and accuracy of calculations.

Topics: Programming in C and/or Python, simulation and the modeling process; errors, modeling errors, implementation errors, absolute and relative errors, error propagation; issues of numeric representation, calculation, and precision; modeling problems involving rate of change, under constrained growth and decay, constrained growth; modeling problems involving force and motion; data-driven models, monte-carlo simulations.

Lab Exercises: Scientific programming and simulations. Modeling specific problems such as falling motion, pendulum motion, gas motion and disease spread.

CE 322 Digital Systems Design

Required of CE, EE, and ME students
Prerequisite: Circuits and Electronics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

In this course students will study the principles of digital systems and computers. They will learn digital system theory and design techniques, including Boolean algebra, binary arithmetic, digital representation of data, truth tables, gates, flip-flops, finite state machines, memory, and timing issues. Students will gain experience with several levels of digital systems, from simple logic circuits to microcontrollers, in order to design, simulate and implement digital systems. They will also learn how processors and microcontrollers are used for control by interfacing sensors and actuators.

Topics: Binary numbers and operations, Boolean algebra, combinational and sequential logic, digital system design, finite state machines, hardware description language (such Verilog or VHDL), programmable devices, ADC and DAC, interface protocols, processor and microcontroller architecture and interface.

Lab Exercises: CAD tool and FPGAs, Introduction to HDL (Verilog or VHDL), combinational circuits (adder, encoder and decoders, multiplexer), sequential digital modules: (registers, timer), data acquisition, microcontroller, etc.

CE 451 Embedded Systems

Required of CE and EE students, elective for ME students
Prerequisite: Computer Programming (for Engineering or Computer Science) and Digital Systems Design (or, Computer Organization for non-Engineering students)
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This course will cover the design and implementation of embedded systems from a hardware and software perspective. Students will go through the design process of embedded systems for specific applications and analyze the tradeoff between a hardware and software implementation. They will be introduced to fundamentals of digital system design using HDL (such as Verilog or VHDL), simulation, validation, synthesis and implementation. They will also learn software development techniques unique to embedded systems such as real time operations, I/O operations, and

communications. They will have hands on practical experience using programmable devices like FPGAs.

Topics: Processor interface, peripherals, external communication, bus systems, programmable devices, hardware/software optimization, embedded system OS (like Xlinix kernel, tinyos, linux), real time operation.

Lab exercises: Processor architecture (Microblaze MIPS processor), implementation of digital systems on FPGAs, design peripherals, peripheral – processor interface, embedded system development, memory and power optimization, simulation and validation, embedded system programming using C and other suitable languages.

Electrical and Electronic Engineering Courses

EE 222 Circuits and Electronics

Required of CE, EE, and ME students
Prerequisite: Physics II: Electromagnetism and *Multivariable Calculus & Linear Algebra*
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 3

In this course students will study the principles and workings of electronic components and design circuits common in electronic systems like amplifiers and filters. Students will learn how to develop mathematical models for electronic circuits and find solutions in time and frequency domain. At the end of the course students should have learnt how to model and design simple analog electronics systems.

Topics: Electronic components (resistors, capacitors, inductors, diodes, transistors, relays, switches and transformers), solid state components (diodes, transistors, zener, photo diode, FET, MOSFET), circuit analysis, Kirchhoff's Laws, Norton's Theorem, Thevenin's Theorem, electronics networks, analog electronic circuits like amplifiers and filters, power sources, time domain and frequency domain solutions

Lab Exercises: Characteristics of electronic components like diode, pn junction, transistor, analysis and simulation of analog circuits, design of amplifiers, filters, rectifiers, oscillators, etc.

EE 242 Introduction to Electrical Machines and Power Electronics

Required of EE and ME students, elective for CE students
Prerequisite: Physics I: Mechanics, Physics II: Electromagnetism, and previous or concurrent enrollment in Circuits & Electronics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 1.5; Hours per week discussion/lab: 3

This is a hands-on course that introduces students to the fundamental principles underlying electro-mechanical machines and devices, their design, and their maintenance. It provides a treatment of transformers, synchronous generators and motors, induction motors, DC motors, speed and torque control, protective devices, an introduction to power electronics, electrical (regenerative) braking.

Topics: Introduction to machinery principles; Transformers: (types and construction, Ideal transformer, single phase, tap changing, efficiency, equivalent circuit, autotransformer, three phase using two phase transformers, instrument transformers); Introduction to Power Electronics: components (diode, thyristor, DIAC, TRIAC), rectifier circuits; AC Machinery Fundamentals: rotating

magnetic field, mmf and flux distribution, induced voltage and torque (2-pole stator, 3-phase coils), winding insulation, power flows and losses, voltage and speed regulation, Synchronous Generators: construction, speed, equivalent circuit, phasor diagrams, power and torque; Synchronous Motors: equivalent circuits, steady state operation (characteristic curves for torque, speed, load, power factor correction, synchronous capacitor etc); Induction Motors: construction, torque, slip, frequency on rotor, equivalent circuits (transformer model, rotor model etc.), power and torque, motor-torque speed characteristics, starting circuits, speed control (pole changing, frequency, voltage, rotor resistance), induction motor drives; DC Machinery Fundamentals: commutation, construction, problems with commutation, power flow and losses, internal generated voltage and induced torque; DC Motors: separately excited and shunt DC motors, permanent magnet DC motor, series and compound DC motor (torque, speed characteristics and speed control), overview of DC starters.

Lab Exercises: Starting arrangements, coupling, motor performance under changing load and voltage, speed and torque control.

EE 321 Communication Systems

Required of CE and EE students, elective for ME students
Prerequisite: Physics II: Electromagnetism, Circuits and Electronics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

Students will learn the working principle and design of modern wired and wireless electronic communication systems. The course focuses on basic principles in the analysis and design of modern communication systems, the workhorses behind the information age. The treatment of analogue communications serves as a necessary background for understanding digital communications. At the end of the course, the students will have an introduction to electronic communication systems and their building blocks.

Topics: Deterministic and random signals and signal space, analysis and transmission of signals, transmission media and devices, analog and digital modulation systems (including amplitude modulation and demodulation, angle modulation and demodulation), sampling and analog to digital conversion, principles of digital data transmission, transmission over dispersive channels, fundamentals of probability theory, random processes and spectral analysis, performance analysis of modulated communication systems under noise, performance analysis of digital communication systems, spread spectrum communications, digital communications under linearly distortive channels, channel models, information theory, source and channel coding, error correcting codes.

Lab Exercises: Modulation, spectrum analysis, encoders and decoders, error detection and correction, signal strength.

EE 342 Electrical Machines II

Required of EE and elective for ME students
Prerequisite: Introduction to Electrical Machines and Power Electronics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 1.5; Hours per week discussion/lab: 3

This is an advanced class that provides students further principles governing the operation of electro-mechanical machines and devices, their design, and their maintenance. There is also a

treatment of special purpose motors such as variable reluctance machines and stepping motors. It provides an advanced treatment of power electronics, synchronous generators and motors including transients, induction motors (with topics including determining circuit model parameters etc), induction generators, DC generators, parallel generators, transformers, single-phase and two phase motors, speed and torque control.

Topics: Power Electronics: components (diode, thyristor, DIAC, TRIAC, power and speed comparison), rectifier circuits, pulse circuits, voltage variation by AC phase control, DC-to-DC power control-choppers, inverters, harmonic problems; Synchronous Generators*:* measuring model parameters, parallel operation of AC generators, synchronous generator transients, generator ratings (voltage, speed, frequency, power factor ratings, capability curves, short time operation and service factor);Synchronous Motors: characteristic curves, motor starting (with reduced frequency, external prime mover, amortisseur windings etc.), synchronous generators, motor ratings; Induction Motors: construction, torque, slip, frequency on rotor, equivalent circuits, characteristic curves, induction motor drives, determining circuit model parameters, induction generator, motor ratings; DC Motors and Generators: equivalent circuit, magnetization curve of DC machine, review motor types, and characteristics, DC starters, solid state speed controllers, efficiency, DC generators, (separately excited, shunt, series, cumulatively compounded and differentially compounded DC generator); Single-Phase and Special-Purpose Motors: single phase induction motors, cross field theory of single phase induction motors, starting arrangements (split phase, capacitor-start, permanent split, capacitor start-capacitor-run, shade pole,) speed control, equivalent circuit, Reluctance motors, hysteresis motor, stepper motors, brushless DC motors.

Lab Exercises: Thyristors, AC and DC motor control, servo motors, variable speed drives (AC and DC drives).

EE 421 Digital and Analog Signal Processing in Telecommunications

Elective for CE and EE students
Prerequisite: Communication Systems
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This course includes the study of signal processing and technology used in the telecommunication industry. Students will study various digital and analog signal processing techniques. Starting from the basic definitions of a discrete-time signal, through Fourier analysis, filter design, sampling, interpolation and quantization, more advanced tools are studied to aid the study and design of digital communications systems. Note: CE and EE students wishing to work in the telecommunications industry are advised to take *Digital and Analog Signal Processing in Telecommunications* as one of their electives.

Topics: Discrete time signals and systems; transform analysis of linear time invariant systems, z-transforms, sampling of continuous-time signals, structures for discrete-time systems, Fourier transforms, fast Fourier transforms, computation of the discrete Fourier transform, Fourier analysis of signals using the discrete Fourier transform, signal averaging, signal compression, convolution, parametric signal modeling, discrete Hilbert transforms filters, complex techniques, and applications of all of these.

Lab Exercise: Signal processing, spectrum analysis.

Mechanical Engineering Courses

ME 301 Mechanical Machine Design

Required of ME students, elective for EE students
Prerequisite: Physics I: Mechanics, Mechanics of Materials
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 1.5; Hours per week discussion/lab: 3

This class will introduce students to the common components of machine design.

Topics: Principles of Machine Design; Materials; Stress and Deformation Analysis, Combined Stresses and Mohr's Circle, Design for Different Types of Loading; Fabrication Methods; Safety and Tolerance in Design and Fits; Design for Maintainability. Machine Frames, Design of Bolted Joints, Welded Joints, Screws, Springs, Hub-Shift Joints, Shafts and Shafting, Axles, Rolling Contact Bearings, Plain Surface Bearings, Gears and Gearing (including spur, helical, bevel gears and Wormgearing), Coupling Systems and Torque Converters, Keys and Seals; Transmission Systems, Linear Motion Elements, Lubrication, Belt Drives and Chain Drives, Kinematics of Gears; Applications of Machine Parts, Design of Power Transmission; Electric Motors and Controls, Motions Control (clutches and brakes).

Labs: Design projects involving CAD and fabrication of machine assemblies and components.

ME 311 Mechanics of Materials

Required of ME students, elective for EE students
Prerequisite: Physics I: Mechanics, Materials Science &Chemistry, and Dynamic Systems
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 3

This course is the study of static mechanics of deformable bodies, and introduces the design of engineering structures. Students will study the concept of stress and strain at a point, stress-temperature relationships, force and deformation analyses of bodies under axial, shearing, flexural, torsional and combined loadings, shear and bending moment diagrams, and Euler Columns. This course focuses on the application of static mechanics on engineering materials and structures. Students will learn how to model and simulate structures with distributed loads, thermal loads and torsional loads using software, scaled models and others for analysis and testing. At the end of the course students will be able to analyze integrity and stress of common engineering structures.

Topics: Equilibrium, stress, strain, deformation, elasticity, thermal stress, shear stress, stress concentration, elastic buckling of columns, bending of beams, concrete mixtures and structures, foundations. Energy methods of solving statically indeterminate situations.

Lab Exercise: Tension and compression, modulus of elasticity, measurement of torsion in shafts, coefficient of thermal expansion, modeling and simulation of structures.

ME 411 Thermodynamics

Required of EE and ME students, elective for CE students
Prerequisite: Physics I: Mechanics, Dynamic Systems
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This is an integrated course of thermodynamics and fluid dynamics theories and their application to engineering systems, and the study of heat transfer by conduction, convection, and radiation. The course will look at the application of thermodynamics and fluid dynamics principles in systems like engines, refrigeration cycles and pumps. Students will study in detail the basic sciences behind thermal and fluid systems.

Topics: Ideal gas, thermodynamics laws, thermodynamic states or entropy and reversible and irreversible processes, thermodynamic equilibrium and entropy, heat transfer, volume, mass and energy conservation, Carnot, Rankine, Brayton, and Otto cycles, classification of fluid flow, ideal fluid flow, laminar and turbulent flow, flow analysis, head loss in pipes, mixtures, combustions, design of heat exchangers, NTU method.

Lab Exercises: Simulation of thermodynamics systems and fluid dynamics systems. Gas laws, spark-ignition cycle experiments, heat transfer, and refrigeration cycles.

ME 421 Heat Transfer

Required of ME students, elective for EE students
Prerequisite: Thermodynamics
Credit Hours: 5; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 3

This course teaches students about design and analysis of thermal systems. Students will study the operation of different kind of thermal engines, heating and cooling systems. They will apply thermodynamic and heat transfer principles to study thermal systems in different application including power generation.

Topics: Rotodynamic machines (steam and gas turbine plants), positive displacement machines (compressors, pumps, air motors), reciprocating internal combustion engines, refrigeration, air-conditioning, psychrometry, and heat pumps. Heat transfer. Sources, use and management of energy.

ME 431 Fluid Mechanics and Applications

Elective for EE, ME students
Prerequisite: Thermodynamics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This course is the application of fluid mechanics in engineering and industrial processes. The course will discuss theories and principles of fluid dynamics and statics using engineering applications as examples. They will learn how to design and analyze fluid systems like hydraulics, pneumatics, pipes, and pump systems. At the end of the course students should be able to design and analyze different fluid systems.

Topics: Hydrostatic pressure, buoyancy, the Bernoulli equation. Reynolds numbers, and predicting laminar or turbulent flow. Head loss computations. Velocity profiles in laminar and turbulent flow. Pump selection based on the pipe network being supplied. Fans, blowers, and compressors selection.

Lab Exercise: Viscosity measurement, designing hydraulic systems, analysis and design of duct and pipe systems, simulation of fluid mechanics systems.

ME 441 Manufacturing Processes

Required for ME, Elective for CE, ME students
Prerequisite: none
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 3

Manufacturing industries are a vital component of all modern economies and all of them require employees who are skilled in, and knowledgeable about, manufacturing processes. This course is designed to provide students with an overview of a wide variety of manufacturing processes. It deals with the principles, analysis and selection of manufacturing processes. Students will understand solidification, metal forming and sheet metalworking, material removal, joining, and assembly processes. Manufacturing systems will be discussed. Design for manufacturing and manufacturing economics are introduced. Lab sections and an individual final project will provide students valuable hands-on experience in using machines to design and make products.

EE 451 Power Engineering

Elective for EE, ME students
Prerequisite: Circuits and Electronics, Introduction to Electrical Machines and Power Electronics
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This course is the study of electrical energy generation and use in various industries. The course will look at how electrical energy is generated from and converted to other forms of energy. Students will study power generation systems, transmission, distribution systems, electrical components, electric power utilization and power quality. Students will also study how to strategically bring together power technology to make needed energy available by considering need, the environment, and sustainability. Note: EE and ME majors wishing to work in the power systems industry are advised to take *Power Engineering* and *Power Systems Analysis* as their two electives.

Topics: Power generation technologies, power transformers, motors, power distribution analysis and design, power network monitoring and control, uninterrupted power supplies, hydro, thermal, and renewable power sources (e.g. solar, wind), high voltage components including transmission line structures, grid, operation, power stations and generating plants, protection, insulation, reactive power compensation, high voltage DC transmission, control systems and power system operation, distribution short circuit protection, electric power utilization (metering, load characteristics), power quality (e.g. harmonics, voltage fluctuations), and a review of synchronous electrical machinery and thermal generating plants.

Lab exercises: Power generators, transformer synchronization, conductance measurements, test and measurement of power systems, power system design. Group Project: network design, power system for industry, alternative power source, wind turbine, analyze solar power, etc.

EE 453 Power Systems Analysis

Elective for EE and ME students
Prerequisite: Power Engineering

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion/lab: 1.5

This course is a study of advanced topics in electric power distribution systems planning and operation. In this course, students will learn how to analyze flows on power networks and their applications to real systems. It provides students with a working knowledge of power system problems and computer techniques used to solve some of these problems. It also provides a technical treatment of the general problem of power system stability and its relevance. They will learn how to strategically bring together power technology to make energy available to industry by considering need, environment and sustainability. Note: EE and ME majors wishing to work in the power systems industry are advised to take *Power Engineering* and *Power Systems Analysis* as their two electives.

Topics: Network equations, and per unit system, power transformers, transmission line parameters and modeling (including induction and complex power transmission), steady state and transient operation, transformer modeling, generator modeling (machine view point and circuit viewpoint), network matrices, power flow analysis (including solution by Newton-Raphson and Gauss iteration), faults (symmetrical and unsymmetrical), system protection, power system controls, transient stability, power distribution. Economic operation of power systems.

Lab Exercise: Transmission Line Modeling, transmission line with different load conditions, load flow analysis etc.

Computer Science Courses

In today's society, every University graduate must be able to utilize computers as a tool in their professional work; this is especially true of engineers, whose technical work relies on computers for design, simulation, and modeling. In addition, computerized components are integrated into a myriad of engineered projects, and so all engineers should have grounding in basic programming and computer systems.

Computer Science core or elective courses for the Engineering programme are:

CS 112 Computer Programming for Engineering

Required of CE, EE, and ME majors, an option for CS and MIS majors as of Fall 2015
Prerequisite: Familiarity with computers
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This is a first course in computer programming, primarily intended for students pursuing a major in computer science or engineering, and/or who have had some previous programming practice. Topics include computer representation of data, object-oriented programming, variables and assignments, primitive types and operations, conditional execution, iteration, arrays, classes, methods, recursion, object types, encapsulation, inheritance and reasoning about programs. The course includes a laboratory component designed to enhance conceptualization.

CS 222 Data Structures and Algorithms

Required of CE and CS majors, elective for EE, ME, and MIS majors
Prerequisite: Computer Programming (for Engineering or Computer Science)
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course covers fundamental abstract data types and their implementations as data structures such as lists and trees and introduces asymptotic analyses of algorithms involving these data structures. Students will also learn about searching (dictionaries, priority queues, and hashing); sorting (internal and external); graphs and algorithms on graphs (shortest path, minimum spanning trees); and pattern matching.

CS 312 Intermediate Computer Programming

Elective for CE, EE, ME and MIS majors, required for CS majors
Prerequisite: Computer Programming (for Engineering or Computer Science)
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course will introduce students to more details of object definition, program construction, and event-driven programming. It will also introduce additional standard Java packages, including the file system and graphical user interface elements. Basic data structures will be introduced and implemented, including lists, stacks, queues, and simple kinds of trees (through binary search trees). This course will also give students an introduction to C++ and to programming techniques for dynamic data structures. Students will study algorithms for ordering, searching, traversing and manipulating these data structures, including some recursive algorithms. Good software engineering practices will be featured in various aspects of the course, and notations similar to the Unified Modeling Language (UML) will be employed. Through one or more team projects, students will gain experience in designing and implementing larger systems. However, the emphasis of the course will be on the use of prewritten packages and built-in language facilities, as well as design and implementation of moderately sized custom classes and algorithms, rather than on the design of whole systems.

CS 323 Database Management

Elective for CE majors, required for CS and MIS majors
Prerequisite: Computer Programming (for Engineering or Computer Science) and Digital Systems Design (or Discrete Mathematics or Data Structures & Algorithms)
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course provides a comprehensive overview of database systems. Students will learn the fundamentals of data access and file systems, including hierarchical, network, relational and object oriented data models. The course will cover the elements of relational database design, data query languages, services such as data protection and integrity control, and database management. The course will provide a balance of theory and practical application and will culminate in a database implementation project conducted by teams of students.

CS 415 Software Engineering

Elective for CE and EE majors; required of CS and MIS majors
Prerequisite: Computer Programming and 3rd Year Group Project
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course covers the fundamentals of software engineering with a focus on the software lifecycle and developing quality software as a team. Topics covered include requirements, specification, design, quality assurance and testing, process, as well as tools and environments. The course will include a programming project in which teams of 4-6 students take a high-level concept provided by the instructor from requirements through implementation.

CS 432 Networks and Distributed Computing

Required of CE, CS, and MIS majors, elective for EE and ME majors
Prerequisite: Computer Programming
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course introduces the underlying principles of computer network design, from the physical layer up through data transport protocols. Physical layer interface alternatives and mechanisms employed by common protocols at layers 2 to 4 are discussed. Methods for constructing distributed computing systems and network services are discussed in the context of common internet systems such as electronic mail, print and file servers and Web services. A holistic view of network and information security is introduced: encryption standards, cryptographic techniques and social issues. The goal of this course is to provide students with an understanding of how to construct large-scale computer networks. Note: EE majors wishing to work in the telecommunications industry are advised to take *Networks and Distributed Computing and Digital and Analog Signal Processing in Telecommunications* as their two electives.

Topics: Applications of networks, hardware and software, network architecture reference models, physical layer interface alternatives: guided and unguided media, and common networks including fiber, VSAT, cable standards, wireless standards and networks such as mobile telephone systems. Modulation and multiplexing techniques. An introduction to information theory (Shannon, Nyquist etc.). Protocols for flow control, error detection and control, media access control, routing and congestion control, and transport protocols. Sockets programming is introduced. Cryptography, authentication, pubic key algorithms, symmetric key algorithms and digital signatures.

CS 435 Operating Systems

Required of CE, CS, and MIS majors; elective for EE majors;
Prerequisite: Computer Programming and Digital Systems Design
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

The course covers the main concepts and issues in operating system design, implementation and engineering, and is roughly divided along three dimensions: core operating systems concepts, information technology, and systems programming. Core operating system concepts involves understanding how operating systems work, what the features are, how they are designed, the issues with various approaches, and an overview of computer science techniques used or applied in operating systems. The aim of this part of the course is for students to understand and even build or contribute to some parts of an operating system. The course will include a team project.

Topics: Operating system structures, processes, threads, CPU scheduling, synchronization and deadlocks, system calls, interrupts, OS data structures, process management, memory management, including virtual memory, storage/file system management, mass storage structure, I/O systems, device management, resource allocation, scheduling, security and protection, Storage management: distributed System structures, distributed file systems and distributed coordination. Real time operating systems. Case study of influential operating systems (including at least one of Linux, Windows). Overview of system administration, OS installation and configuration, shell scripting, system programming, applications support, case studies.

CS 453 Robotics

Elective for CE, EE, ME, CS, and MIS majors

Prerequisite: Computer Programming and Calculus I
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week lab: 1.5

This course gives a practical hands-on as well as theoretical introduction to robotics as a field that integrates expertise in Computer Science, Engineering, Design and Mathematics to create innovative systems that interact with and can operate autonomously or semi-autonomously in the physical world. In this course, students will work individually and in groups to implement robotics projects using robotics platforms such as the Lego Mindstorms and EV3 kits, and the TurtleBot robot, as well as other electronic and mechanical components. Through these projects, they will learn how to build and write programs for an autonomous physical device that interacts with its environment. They will also learn to read and understand robotics research papers, to give presentations to technical and non-technical audiences, and follow a project through from an initial idea through design to implementation and testing.

Topics: Historical overview of robotics, mobile robots and manipulators, kinematics of differential drive robotics, basic kinematics of manipulators, locomotion, sensing and perception, vision, control, motion planning, task planning, control architectures, advanced/special topics such as multi-robot coordination, robot learning.89

Humanities and Social Sciences and Liberal Arts Core

AS 111 Ashesi Success
Required for All Freshmen

Prerequisite(s): None

Offered: Fall

Course Type: Seminar, Experiential

Credit Hours: 3; Ashesi Credit Units: 0; Hours per week classroom: 3; Hours per week discussion: 0

A program designed to enhance your overall success in college and in life. The most important objective of the program is personal empowerment: learning who you are as a college student, learning who you are as a human being and what you stand for, learning how to speak up when your values are in conflict with those around you, and learning what it takes for you to keep yourself balanced and on course to success. When you are empowered your actions are more purposeful and your choices more deliberate. When

you are empowered you are more engaged and more motivated every day. And when you are empowered you have a greater sense of well-being and enjoyment in life.

ENGL 112 Written and Oral Communication

Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): None

Offered: Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

This course offers an introduction to the practices of reading and writing for general university studies. Students will develop academic writing and analytical skills through critical reading, group discussion and various writing assignments. Strong emphasis will be placed on revising, with weekly workshops to clarify assignments and expectations and/or receive recommendations and feedback on works in progress.

ENGL 113 Text and Meaning

Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): None
Offered: Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

Text and Meaning takes a fresh approach to the study of literary and critical theory, integrating critical thinking into activities to increase students' very ability to learn and question. It is designed to teach students critical thinking skills, how to pose questions, propose hypotheses, gather and analyze data, and make arguments. In order to accomplish this, the term 'text' is used in its broadest possible sense, and includes literature, newspapers, magazines, speeches, advertising, websites, blogs, film, music and documentaries. Put simply, Text and Meaning encourages students to do their own intellectual fishing, instead of waiting to be served.

ENGL 215 African Literature

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

African Literature, as a broad conceptual category, covers a broad array of discourses flung across the continent's various sub-cultures and its multiple language heritages. Given that wide and far-reaching background, we shall set ourselves a modest and researchable goal for the semester: we shall imagine the course as a survey course meant to offer a formal introduction to African literature in its broadest historical and cultural contexts. We shall interrogate some popular debates within African literary discourse (colonialism and cultural imperialism; the possibility of an "African" literature in non-African but Europhone languages; cultural nationalism and the independent nation-state; and gender, sexuality

and African cultural traditions) and also invoke the peculiar historical, socio-cultural and cultural contexts that inform our selected texts.

ENGL 231 African Literature & Film

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

The course aims to introduce students to some of the major debates in the subjects of African Literature and Film. Through an interdisciplinary approach, we will study African cultural creations supplemented with short theoretical readings centered on the following interconnected topics: decolonization, gender, language and storytelling.
We will cover the continent's engagement with Western thought and literary traditions, explore traditional oral literatures, examine commonalities in style and theme and tackle issues of gender and ethnicity. We will examine the literary works as complex expressions of their contexts, as well as indicators of the values and world views of the societies in which they were composed.
Through class discussions, writing assignments and individual research, students will be able to combine and integrate the sum of knowledge learned in this class with knowledge and skills gained in other courses, notably Written & Oral Communication and Text & Meaning.

FRENC 111 Introductory French 1

Non-major elective

Prerequisite(s): None

Offered: Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

The economic development being experienced by Ghana and the geographical location of the country (surrounded by francophone countries), its trade relations with its neighboring francophone countries, makes both the French language a fundamental means of communication in Ghana, especially in business and at all level of business transactions. To be competent and competitive in the region, companies have understood that to be able to communicate, both in French and English is a plus, and that there is therefore a need to have bilingually trained staff.

In response to this need, Ashesi University has decided to offer its students, training in French, which will enable them to become « independent users » of French which means that they can easily survive in a francophone environment. The objective is to bring them to attain a level B1 or B2 of the CEFR (Common European Framework of Reference for Languages).

The Common European Framework divides learners into three broad divisions that can be divided into six levels: A1, A2, B1, B2, C1 & C2. For each level, it describes what a learner should be able to do in reading, listening, speaking and writing. We want our student who are taking the Introduction to French 1 class to get to meet the requirements of level A1.

FRENC 122 Professional French 1

Non-major elective

Prerequisite(s): None

Offered: Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

The economic development being experienced by Ghana and the geographical location of the country (surrounded by francophone countries), its trade relations with its neighboring francophone countries, makes both the French language a fundamental means of communication in Ghana, especially in business and at all level of business transactions. To be competent and competitive in the region, companies have understood that to be able to communicate both in French and English is a plus, and that there is therefore a need to have bilingually trained staff.

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The Common European Framework divides learners into three broad divisions that can be divided into six levels: A1, A2, B1, B2, C1 & C2. For each level, it describes what a learner should be able to do in reading, listening, speaking and writing. We want our student who are taking the Professional French 2 class to get to meet the requirements of level B1.

FRENC 123 Introductory French 2

Non-major elective

Prerequisite(s): None

Offered: Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

The economic development being experienced by Ghana and the geographical location of the country (surrounded by francophone countries), its trade relations with its neighboring francophone countries, makes both the French language a fundamental means of communication in Ghana, especially in business and at all level of business transactions. To be competent and competitive in the region, companies have understood that to be able to communicate, both in French and English is a plus, and that there is therefore a need to have bilingually trained staff.

In response to this need, Ashesi University has decided to offer its students, training in French, which will enable them to become « independent users » of French which means that they can easily survive in a francophone environment. The objective is to bring them to attain a level B1 or B2 of the CEFR (Common European Framework of Reference for Languages).

The Common European Framework divides learners into three broad divisions that can be divided into six levels: A1, A2, B1, B2, C1 & C2. For each level, it describes what a learner should be able to

do in reading, listening, speaking and writing. We want our student who are taking the Intermediate French 2 class to go towards the requirements of level B1.

FRENC 214 Professional French 2

Non-major elective

Prerequisite(s): None

Offered: Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 1; Hours per week discussion: 1

The economic development being experienced by Ghana and the geographical location of the country (surrounded by francophone countries), its trade relations with its neighboring francophone countries, makes both the French language a fundamental means of communication in Ghana, especially in business and at all level of business transactions. To be competent and competitive in the region, companies have understood that to be able to communicate both in French and English is a plus, and that there is therefore a need to have bilingually trained staff.

In response to this need, Ashesi University College has decided to offer its students, training in French, which will enable them to become « independent users » of French which means that they can easily survive in a francophone environment. The objective is to bring them to attain a level B1 or B2 of the CEFR (Common European Framework of Reference for Languages).

The Common European Framework divides learners into three broad divisions that can be divided into six levels: A1, A2, B1, B2, C1 & C2. For each level, it describes what a learner should be able to do in reading, listening, speaking and writing. We want our student who are taking the Professional French 2 class to get to meet the requirements of level B1.

POLS 221 African Philosophical Thought

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

A serious thinking through or reflection on the practical/tangible aspects of the human experience is the goal of philosophy. This course is an introduction to a variety of themes of philosophical thinking in Africa. The approach adopted to advance the goals of the course, differs from traditional philosophy courses in a significant way. Specifically, we will read about the works of African philosophers; apply/interrogate such thoughts in such works to grounded cultural practices in actual and mediated lives; and think through and dialogue with fellow colleagues on the readings in this class. Thus, needless to say, throughout the course we will use concrete examples to ground readings which may sometimes be abstract. The goal of this grounded approach is to demonstrate the relevance of philosophical thinking in contemporary times and also to negate the idea that

'philosophy' does not 'touch ground' (that is, it is only intellectual exercise) and is thus only a 'thinking' (and boring) subject.

POLS 231 Africa in International Affairs

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Fall

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

Across the African continent many want to do away with decades of aid dependency striving instead for a more assertive Africa on the international scene. This course encourages informed debate and a varied assessment of what overseas development assistance has evolved into over the years and how can it be complemented and replaced by more effective and relevant resources. It will offer a variety of case studies from individual African countries as well as identifying regional trends and characteristics.

The course aims to locate the topical 'Beyond Aid' debate in a theoretical, historical and regional perspective. It offers an introduction to main tenets of development theory and provides an overview of how international norms guiding development policy have evolved from the first development decade of the 1960s to the Sustainable Development Goals (SDGs) adopted by the UN in 2015.

Furthermore, the course assesses the changing role of development assistance in the context of African economic and social development and will compare contemporary data on the role of aid relative to trade, remittances and foreign direct investments. It will look at challenges confronting African countries aiming to offer a more diverse and varied understanding of development options and constraints relative to the often-stereotyped perceptions of 'one size fits all' presumably meant to apply across 54 very different nations on the continent. And it will look at how access to financial resources influence the position of African governments in shaping current geopolitical alliances.

POLS 332 Governance in Africa

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

What are the big ideas, essential questions, disciplinary ways of thinking, and/or approaches to problem solving that students will engage with in the course? Why are they relevant?

In social theory as well as public policy the concept of 'governance' is often associated with normative prefixes: *good* governance, *effective* governance, *sound* governance etc. Likewise, governance may often be perceived as acts performed primarily by governments. This course will aim to unpack governance from the 'embrace' of being a government prerogative and rather consider governance as institutional processes involving multiple

actors inside and outside of government who endeavour to arrive at effective rules of the game for authoritative decision-making.
Rather than promoting a normative scheme, the course will suggest that governance must be considered as decisively shaped by the country and societal context. It offers a pragmatic approach to what can be considered 'best fit' given the circumstances rather than ideal notions of 'best practice'.
Such an approach offers analytical tools and enhanced awareness of how existing governance arrangements affect available opportunities and by what means institutional frameworks can be adjusted and made more responsive to needs of citizens, enterprises and the wider society.
The course offers a balance between global and international ideas and theories on governance on the one hand and on the other hand specific case studies from the African region, thereby aiming to verify and qualify generic statements on the nature of politics in Africa.

SOAN 220 African Aesthetics Values

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Summer

Course Type: Lecture, Experiential

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

It entails various aspects of African culture including music, dance, language, religion, cosmology and symbolism. Usually, teaching this course in the summer makes use of both ontological and epistemological approaches with loads of photos, videos and practical demonstrations.

SOAN 225 Ghanaian Popular Culture

Non-major elective

Prerequisite(s): Written and Oral Communication

Offered: Typically offered in the Spring

Course Type: Lecture

Credit Hours: 3; Ashesi Credit Units: 1; Hours per week classroom: 2; Hours per week discussion: 1

This Ghanaian Popular Culture course is an undergraduate, 300-level, African Studies elective at Ashesi University College. The course uses creative and engaging content in Ghanaian Popular Culture (for instance, video movies, vehicle inscriptions, political cartoons) as a channel for teaching disciplinary analytical thinking and reasoning skills to focus on academic writing, and to indirectly prepare students for capstone projects.

SOAN 233 African Music and Dance: Traditional and Contemporary Music (with a Focus on Ghana)

Non-major elective

Prerequisite(s): None

Offered: Typically offered in the Spring

Course Type: Lecture, Experiential

Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

This course explores the role of music and dance as essential components of life within African traditions. It introduces students to the basic elements of African life as connected to music and dance. It will extend to include some aspects of contemporary African music and dance. The course exposes students to the connection between music and dance and their role as repositories of African indigenous knowledge, values and virtues. Students will be given skills to conceptually and practically explore the socio-historical and cultural contexts of the African life through examination of specific music and dance types. It will be delivered through lectures, workshops, practical observations and demonstrations.

SOAN 227 Religion in Africa

Non-major elective

Prerequisite(s): Written and Oral Communication
Offered: Typically offered in the Fall
Course Type: Lecture

This course is intended to expand your knowledge of the nature of religion in general, and of the major religious traditions of the world. We will explore theories of the origins of religion. You will gain knowledge of the major beliefs, practices and history of pre-literate religions in Africa and around the world, Buddhism, Hinduism, Jainism, Sikhism, Judaism, Confucianism, Taoism, Shinto, Zoroastrianism, Christianity, and Islam. In addition, we will explore themes common to many religions such as ideas of God, human nature, death, salvation and the question of the immortality of the soul. Of course, you will, as individuals with your own beliefs, come to your own judgments about the merits of the religions and beliefs we will be studying. But those judgments are not relevant to our work in this course. For the purposes of the course, your goal should be the highest level of understanding you can attain of traditions and beliefs that may be entirely new to you. If all goes well, you may begin to see important points of comparison, contrast, and "family resemblances" among religions.

SOAN 320: WORLD HUNGER, POPULATION & FOOD SUPPLIES

Prerequisite(s): Written and Oral Communication. *BA students can enroll in this class as a major elective.*

Offered: Semester Two
Course Type: Lecture
Credit Hours: 4; Ashesi Credit Units: 1; Hours per week classroom: 3; Hours per week discussion: 1

Across the African continent many want to do away with decades of aid dependency striving instead for a

Course Description:

This course is specifically designed to cover the issue of Hunger, Food Security and Malnutrition without any prerequisites. In this class you will learn about the dimensions of hunger and its implications; that there is enough food to feed everyone in the world and that there are no mechanisms available for redistributing this food from the people who have too much to the people who have too little. That the world's population continues to grow particularly in the poorest parts of the world but its growth has slowed markedly and we understand most of the drivers of population growth and the policies that would could lead to reduced fertility. And finally, that technological change in the agricultural sector of the poorest countries of the world is one of the most effective ways to simultaneously reduce population growth and hunger.

Leadership Seminar Series

The Leadership Seminar Series is a series of interdisciplinary seminars designed to promote self-awareness among Ashesi's students and to expose them to the ideas of great historical thinkers and contemporary leaders. Students will be asked to think broadly and to explore how they might use the examples set by other leaders to achieve their goals in their future professional lives. The leadership seminar series draws upon experts in different fields of corporate, social and academic life. Students must complete the full series in order to graduate from Ashesi University. The series consists of the following seminars:

SOAN 111 Leadership Seminar 1

Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): Ashesi Success; Written and Oral Communication
Offered: Spring
Course Type: Seminar
Credit Hours: 3; Ashesi Credit Units: 0.5; Hours per week classroom: 3; Hours per week discussion: 0

A program designed to enhance your overall success in college and in life. The most important objective of the program is personal empowerment: learning who you are as a college student, learning who you are as a human being and what you stand for, learning how to speak up when your values are in conflict with those around you, and learning what it takes for you to keep yourself balanced and on course to success. When you are empowered your actions are more purposeful and your choices more deliberate. When you are empowered you are more engaged and more motivated every day. And when you are empowered you have a greater sense of well-being and enjoyment in life.

This course explores such questions as “What is good leadership? “What are the attributes of a Great Leader? and “What does a good do or not do? In this seminar, students will do readings of various historical and contemporary public and business leaders and explore the ethical dimensions of leadership. This is a half unit seminar taught in the format of discussions and assigned readings. Learning Course content addresses the purpose of leadership and the qualities of a great leader. Students will explore ethics and civic engagement in course readings and discussions. By comparing frameworks for leadership and ethical decision-making and applying those frameworks to leaders in a variety of contexts, students learn to analyze and evaluate the leadership they observe around them. Weekly writing assignments build students’ skills in reflective writing. In-class discussions and debate build students verbal communication and presentation skills.

SOAN 221 Leadership Seminar 2

Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): None
Offered: Fall
Course Type: Seminar
Credit Hours: 3; Ashesi Credit Units: 0.5; Hours per week classroom: 3; Hours per week discussion: 0

This seminar probes the most fundamental questions about the good society: “What are the most fundamental rights of humanity? “What impact does national government have on the trajectory of nations? “What is the Social Contract - Rule of Law, and what impact does it have on civilizations?

After taking this seminar, students should have a deeper understanding of constitutional law and the concept of nations, whose leaders are expected to be servants of the people. This seminar also expands on the discussion of ethics, from corporate social responsibility to ethical issues in public office. Students will develop their skills in writing analytical and reflective papers.

SOAN 311 Leadership Seminar 3
Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): None
Offered: Spring
Course Type: Seminar
Credit Hours: 3; Ashesi Credit Units: 0.5; Hours per week classroom: 3; Hours per week discussion: 0
This seminar asks the questions: "What is the best way to organize the economic activity of a good society? " What is the proper definition of 'best' in the issue? "How do we best achieve a balance of liberty, efficiency, equality and community? This seminar is a natural progression from the previous discussion about Rights and The Rule of Law.
At the end of this seminar students should have a better understanding of the interplay between natural and civil rights on the one hand, and economic activity on the other. They will gain skills in analytical and reflective writing.

SOAN 411 Leadership Seminar 4
Required for all BA, MIS & CS, ENG Majors
Prerequisite(s): None
Offered: Fall, Spring
Course Type: Seminar
Credit Hours: 3; Ashesi Credit Units: 0.5; Hours per week classroom: 3; Hours per week discussion: 0
This seminar is a capstone to the leadership seminar series and puts into practice many of the general concepts discussed in the previous seminars as well as courses taken at Ashesi. In particular, service learning helps students develop a sense of citizenship by giving them an opportunity to become engaged with their surrounding community, while also considering how they can make positive impact on improving that community or solving its problems. The Leadership as Service Seminar is designed to extend this series beyond the classroom, gets students engaged in the larger Ghanaian community, help them experience the impact that they can have in society, and thus develop a confidence that we hope will stay with them through their professional lives.
The course aims to: help you carve out your personal identity as a leader and to find yourself in this equation: personal integrity + desire for social change + relevant skills + creative problem-solving + courage = an Ashesi Leader; to help you understand servant leadership and enhance your ability to lead by example; to help you understand your role as a contributor to problem-solving and positive social change in your community; and to expose you to a variety of leaders, inspire, encourage and support you to be a great servant leader.