2022/2023 Faculty Personnel Gaps

See departments and their respective personnel gaps below:

Business Administration
Semester 1 – Fall 2022
   1. **Foundations of Design and Entrepreneurship (FDE) 2**

Course Description

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 19 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 Start-up Launchpad. 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.

Course details on Page 18 of the [Academic Catalog](). For context, course details for Foundations of Design and Entrepreneurship 1 are on Page 18 as well.

2. **Entrepreneurship Capstone 1**

Course Description

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 startups 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 startups. 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.

Course details on Page 22 of the [Academic Catalog]().

Semester 2 – Spring 2023
1. **Managerial Economics**

Course Description

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.

2. Entrepreneurship Capstone 2

Course Description

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.

3. Foundations of Design and Entrepreneurship (FDE) 1

Course Description

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.

Course details on Page 18 of the [Academic Catalog](#).

Humanities & Social Sciences
Semester 1 – Fall 2022
1. Leadership Seminar 1

Course Description
This course explores such questions as "What is good leadership? "What are the attributes of a Great Leader? and "What does a good leader 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.

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.

Course details on Page 73 of the [Academic Catalog](#).

2. Text and Meaning

Course Description
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. 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.

Course details on Page 64 of the [Academic Catalog](#).

1. Written and Oral Communication

Course Description
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.

Course details on Page 64 of the [Academic Catalog](.).

2. Leadership Seminar 2

Course Description
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.

Course details on Page 73 of the [Academic Catalog](.).

3. Research Methods

Course Description
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; analysing 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.

Course details on Page 29 of the [Academic Catalog](.).

4. Africa in International Settings: Africa Beyond Aid

Course Description
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 2015.6
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.

Course details on pages 68–69 of the [Academic Catalog](#).

Computer Science and Information Systems
Semester 1 – Fall 2022
1. Intermediate Computer Programming

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.

Course details on pages 33 of the [Academic Catalog](#).

2. Data Science

Course Description

Data Science is a powerful toolkit for using data to answer questions and guide decision making. It involves skills and knowledge from statistics, software engineering, machine learning, and data engineering. This course is designed for students interested in using a powerful data science toolkit to collect, clean, pre-process, visualize datasets and fit models. It will provide most of the knowledge needed to start applying statistical and machine learning algorithms to projects by combining hands-on practice with the essential theory. In this class, students work on data science projects that involve collecting data or finding data sources, exploratory data analysis and interactive visualization, statistical analysis, predictive analytics, model selection and validation. Course work also involves readings and case studies on ethical practice in data science.

Semester 2 – Spring 2023

1. Introduction to Modelling & Simulation

Course Description

Real world systems, such as games, communication networks or transportation systems can be modeled using statistics and a variety of modelling formalisms. This course introduces theprocess of designing models of existing or proposed real-world systems, and how to use the models to perform simulations that allow for predictions about the future behavior of the system. Programming assignments give the opportunity to construct prototype modelling tools and simulators based on the theory.   In addition, applications from a variety of are used to illustrate the different modelling formalisms.

Semester 1 OR Semester 2 – Depending on Faculty Availability
1. Computer Graphics

Course Description

Computer graphics are key to many modern software applications. The course introduces the basic concepts of computer graphics, including the theoretical background as well as fundamental algorithms and data structures that are used in today's interactive graphics systems. The course gives the opportunity for students to develop programming skills in computer graphics through programming assignments.

2. Concepts of Programming Languages

Course Description

This course examines fundamentals concepts in programming languages and major tools and techniques to implement them. The key characteristics of major programming paradigms, including the imperative programming paradigm and the functioning programming paradigm, will be studied and compared. Topics covered include specification and informal semantic models; binding and scoping; types and type systems; control

structures; data abstraction; procedural abstraction and parameter passing; higher-order functions; and memory management. Programming assignments will give students the opportunity to master the course concepts.

3. Computer Vision

Course Description
This course introduces computer vision, a subfield of artificial intelligence dealing with how computers gain high-level understanding from digital images or videos. Topics covered include the fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding, depth from stereo and motion, camera calibration, object tracking, boundary detection, and object recognition. The focus will be on theory as well as on practice and implementation, using both classical machine learning and deep learning approaches.

<u>Engineering</u>
<u>Semester 1 – Fall 2022</u>
1. Heat Transfer

Course Description
This course teaches students about design and analysis of thermal systems. Students will study the operation of different kinds of thermal engines, heating and cooling systems. They will apply thermodynamic and heat transfer principles to study thermal systems in different applications 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.

Course details on page 54 of the [Academic Catalog](#).

2. Digital and Analog Signal Processing in Telecommunications

Course Description
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.

Course details on page 52 of the Academic Catalog.

Semester 2 – Spring 2023
1. Instrumentation for Engineering
Course Description

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.

Course details on page 44 of the Academic Catalog.

2. Introduction to Engineering

Course Description
This class mostly teaches drafting, Solid Modeling & CAD with SolidWorks, C programing on Arduino, and basic electronics. It is very project based. There is an introduction to workshop practice, and use of tools and equipment in the workshop and Fab lab.

There is a discussion of ethics and professional practice, material selection etc. It serves as an introduction to the world of Engineering professions.

[[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 SolidWorks, assembling and disassembling products, practical skills in operating lab and field equipment, safety drills, basic design and implementation projects.

Course details on page 44 of the [Academic Catalog](.).

3. Advanced Communication Systems

Course Description
This course covers Mobile, Fibre and Satellite communications mostly. The course will describe the protocols used in current networks. It will provide skills needed in designing and deploying efficient and effective data communications and network technologies. Key Topics include: Wireless and Mobile Communication (Cellular concept, propagation methods/models, antennae, Coding and multi access techniques, Higher Order Modulation – OFDM, etc.) Mobile generations and technology, Digital TV Broadcasting, Core network), Telecommunication Networks (PSTN, IP Radio Access Networks), Advanced Topics in IP Networks (Mobile IP, Quality of Service, Multimedia networking protocols), Switching, Wireless LAN and Mobile Ad-hoc Networks, Fiber Optic Communication and Network, Satellite communications. This course will also develop understanding of some fundamental concepts of information theory, as well as techniques used to model and analyze communication networks. It will briefly highlight how to develop analytical tools and conceptual models for modeling and analyzing network performance. Subtopics will include: Fairness and network utility maximization, Optimization based routing and congestion control, Basic queueing models and their application to switching and scheduling in networks.

Course details on page 56 of the [Academic Catalog](.).

Semester 1 OR Semester 2 – Depending on Faculty Availability
1. Computational Fluid Dynamics (CFD)
2. Renewable and Non-renewable Energy Systems
3. Automation and Production Systems

The three (3) ENG courses listed above are elective options for the Mechanical Engineering major. The course descriptions have been left blank to allow incoming faculty develop descriptions based on chosen themes. As part of your application to teach this course, please include a brief course description.