



German Jordanian University

School of Electrical Engineering and Information Technology

Department of Computer Science

Bachelor of Science in Design and Media Informatics

(A joint program with the Department of Design and
Visual Communication at the School of Architecture
and Built Environment)

Study Plan of 2023

(Last updated: July 23, 2023)

I. Program Vision

To graduate highly qualified people with a Bachelor of Science degree in design and media informatics and strong capabilities of developing and designing human-centered and user-friendly applications interacting with different types of data.

II. Program Mission

To arm students with the required knowledge and experience in the field of design and media informatics that enable them to fulfill society and market needs.

III. Program General Description

The study plan for the Bachelor of Science in Design and Media Informatics focuses on the practical side of the industry, embracing the latest technologies and techniques in digital media, design, and information technology. The modern information society needs creative minds that can bridge the gap between design and computer science in the development of innovative media applications. Therefore, design and media informatics deals with the conception, development, implementation and operation of hardware and software systems for the production, distribution and use of (digital) media. The aim of the education is to provide students with a good start to their careers with a course of study aimed at practical professional skills in the following areas: **game development, augmented/virtual reality development, web/mobile application development, social media development**, storytelling, graphic design, video/animation, User Interface (UI)/User Experience (UX) development, computer graphics, database design and development, software engineering, and project management.

IV. Program Objectives

The primary objectives of the undergraduate program in design and media informatics are to:

- a. Create an understanding of the fundamentals of information, media, and design technologies.
- b. Create an understanding of visual computing (e.g., game design, virtual/augmented reality, computer graphics, computer vision, visualization), multimedia applications (e.g., web/mobile applications, social media applications, video editing, graphic design), and tangible computing.
- c. Provide interdisciplinary education in which graduates acquire knowledge and skills in the creative and user-centered design of media and their development processes.
- d. Build an awareness of design and media informatics in industry and emerging technologies, emphasizing a working knowledge of current design tools and development techniques.
- e. Provide a broad education that enables graduates to understand the impact of human-centered and user-friendly applications in a societal context.
- f. Provide design and media informatics education that enables our graduates to pursue rewarding professional careers, graduate studies, and lifelong learning.

V. Learning Outcomes

At GJU, the design and media informatics program graduates bachelor's students with an understanding of fundamental design and media informatics concepts, methodologies, and technologies as demonstrated by:

- a. An ability to demonstrate a fundamental understanding of algorithms, data structures, software design, concepts of programming languages, application development (game development, web/mobile applications, and desktop applications).
- b. An ability to demonstrate a fundamental understanding of computer graphics, computer vision, visualization, and virtual/augmented reality, and multimedia systems.
- c. An ability to demonstrate understanding of digital media and design, graphic design, storytelling, visual design tools, and interactive Design (UX/UI).
- d. An ability to demonstrate understanding of freehand Drawing, digital Photography, typography for digital media, theory of visual communication design
- e. An ability to demonstrate understanding of discrete mathematics, differential and integral calculus, and linear algebra.
- f. An ability to demonstrate the interactive design and user-friendly applications that deal with various types of data.
- g. An ability to demonstrate an awareness of emerging technologies and the ability to evaluate and utilize currently available software development tools.
- h. An ability to demonstrate the ability to successfully apply the principles and practices for software design and development to real problems.
- i. An ability to demonstrate the ability to communicate effectively, both orally and in written form, and work in a team environment.
- j. An ability to demonstrate familiarity with basic concepts, emerging technologies, and contemporary issues relating to the societal impacts of creative design and visual computing.
- k. An ability to demonstrate an understanding of professional and ethical considerations related to computing and design.
- l. An ability to demonstrate an ability to acquire new knowledge in the computing discipline and to engage in life-long learning.
- m. An ability of being competitive in the computing job market and/or being admitted to a good graduate program in computing.

VI. Framework for B.Sc. Degree (Credit Hours)

Classification	Credit Hours			ECTS		
	Compulsory	Elective	Total	Compulsory	Elective	Total
University Requirements	21	6	27			
School Requirements	22	0	22			
Program Requirements	97	12	109			
Total	143	18	158			

1. University Requirements: (27 credit hours)

1.1. Prerequisite courses (6 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Prerequisites / Co-requisites
				Lect	Lab	
ARB099	Arabic 99a	0		3	-	-
ENGL099	English Iia	0		3	-	
Total		0		6	0	

1.2. Compulsory: (21 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Teaching Method	Contact Hours		Prerequisites / Co-requisites
					Lect	Lab	
ARB100	Arabic	3			3	-	ARB099
ENGL101	English III	1			3	-	ENGL099
ENGL102	English IV	1			3	-	ENGL101
ENGL201	English V	2			3	-	ENGL102
ENGL202	English VI	2			3	-	ENGL201
GERL101B1	German I B1 track	3			9	-	-
GERL102B1	German II B1 track	3			9	-	GERL101B1
GERL102B2	German II B2 track	3			9	-	GERL101B1
MILS100	Military Science	3			3	-	-
NE101	National Education	3			3	-	-
NEE101	National Education (English)						
Total		21			39	0	

1.3. Elective: (6 Credit Hours) (two courses out of the following)

Course ID	Course Name	Credit Hours	ECTS	Teaching Method	Contact Hours		Prerequisites / Co-requisites
					Lect	Lab	
BE302	Business Entrepreneurship	3		Online	3	-	ENGL101
DES101	Arts' Appreciation	3		Online	3	-	ENGL101, ARB099
EI101	Leadership and Emotional Intelligence	3		Online	3	-	ENGL101
IC101	Intercultural Communications	3		Online	3	-	ENGL101
PE101	Sports and Health	3		Online	3	-	ARB099
SE301	Social Entrepreneurship and Enterprises	3		Online	3	-	ENGL101
SFTS101	Soft Skills	3		Online	3	-	ENGL101
TW303	Technical and Workplace Writing	3		Online	3	3	ENGL102
Total		6		-	6	3	

^a Not required for students who pass placement test

2. School Requirements: (22 Credit Hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Prerequisites / Co-requisites
				Lect	Lab	
GERL201B1	German III B1 track	3		6	-	GERL102B1
GERL201B2	German III B2 track	3		6	-	GERL102B2
GERL202B1	German IV B1 track	3		9	-	GERL201B1
GERL202B2	German IV B2 track	3		9	-	GERL201B2
MATH099	Pre Math	0		3	0	-
CS116	Computing fundamentals	3		3	0	-
CS1160	Computing fundamentals lab	1		0	3	Co-requisite CS116
MATH101	Calculus I	3		3	0	MATH099
MATH102	Calculus II	3		3	0	MATH101
EE317	Linear Algebra	3		3	0	MATH101, Co-requisite MATH102
Total		19		30	3	

3. Program Requirements (112 credit hours)

3.1. Program Requirements (Compulsory): (100 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Teaching Method	Contact Hours		Prerequisites / Co-requisites
					Lect	Lab	
GERL301B1	German V B1 track	3		Face-to-Face	9	0	GERL202B1
GERL301B2	German V B2 track	3		Face-to-Face	9	0	GERL202B2
GERL302REG	German VI Regular	3		Face-to-Face	6	0	GERL301B1
GERL302INT	German VI Intensive	3		Face-to-Face	9	0	GERL301B1
GERL302B2	German VI B2 track	3		Face-to-Face	6	0	GERL301B2
ARC111	Fundamentals of Design I	4		Face-to-Face	0	6	-
DES130	Freehand Sketching I	2		Face-to-Face	0	4	-
DMI111	Visual Design Tools	3		Face-to-Face	0	6	ARC111
DMI112	Fundamentals of Digital Media and Design	4		Face-to-Face	0	6	CS116, CS1160
DES151	Principles of Photography	2		Face-to-Face	1	2	ARC111
DES131	Typography / Latin	3		Face-to-Face	2	2	DMI111, DMI112
DES224	History of Visual Communication Design	3		Face-to-Face	3	0	DMI112, ARB099, ENGL099, MATH099
DMI234	3D Modelling	3		Face-to-Face	1	4	DES130, DMI111, ARB099, ENGL099, MATH099
DES225	Theory of Visual Communication Design	3		Face-to-Face	3	0	DES224
DES320	Design Thinking and Methodology	3		Face-to-Face	3	0	Completion of 90 Cr. Hr.
DMI333	Web and Application Design	3		Face-to-Face	1	4	CS254, DMI111, DMI112

CS214	Object-Oriented Programming	3		Face-to-Face	3	0	CS116, CS1160, ARB099, ENGL099, MATH099
CS2140	Object-Oriented Programming Lab	1		Blended	0	3	ARB099, ENGL099, MATH099, Co-requisite CS214
CS254	Visual Programming	3		Face-to-Face	2	2	CS214, CS2140
CS222	Theory of Algorithms	3		Face-to-Face	3	0	CS116, CS1160, ARB099, ENGL099, MATH099
CS223	Data Structures	3		Face-to-Face	2	2	CS116, CS1160, ARB099, ENGL099, MATH099
CS451	Artificial Intelligence	3		Face-to-Face	3	0	CS222, CS223
CS363	Database Management Systems	3		Blended	2	2	CS223, DMI280
CS355	Web Technologies	3		Blended	2	2	CS254, CS363
CS330	Image Understanding	3		Face-to-Face	2	2	CS223, EE317
CS332	Computer Graphics	3		Face-to-Face	2	2	CS223, EE317
CS477	Mobile Computing	3		Face-to-Face	2	2	CS254, CS363, DMI333
DMI473	Game Programming	3		Face-to-Face	2	2	CS254, CS223
DMI475	Virtual and Augmented Reality	3		Face-to-Face	2	2	CS254, CS223
DMI435	Animation	3		Face-to-Face	1	4	CS332, DMI234
DMI436	Game Design	3		Face-to-Face	1	4	DMI435, CS473
DMI434	UX/UI Design	3		Face-to-Face	3	0	CS254, DMI333
DMI390	Field Training	0		Face-to-Face	0	0	Completion of 90 Cr. Hr.
DMI491	International Internship	12		Face-to-Face	0	36	DMI390, BSC001
DMI592	Senior Project	3		Blended	0	9	DES320, Completion of 90 Cr. Hr.
Total		100			64	108	

3.2. Program Requirements (Electives ^b): (12 credit hours)

A minimum of 12 credit hours of coursework are required. This list is open for modifications based on school council decisions.

Course ID	Course Name	Credit Hours	ECTS	Teaching Method	Contact Hours		Prerequisites / Co-requisites
					Lect	Lab	
CS342	Software Engineering	3		Blended	3	0	CS254, CS363
CS439	Computer Animation	3		Face-to-Face	3	0	CS332
CS364	Information Retrieval	3		Face-to-Face	3	0	CS363
CS356	Information Security	3		Face-to-Face	3	0	CS363
CS460	Data Mining	3		Face-to-Face	3	0	CS363
CS462	Database Design	3		Face-to-Face	3	0	CS363
DES411	Information Design	3		Face-to-Face	1	4	-
DMI315	Interactive Design	3		Face-to-Face	1	4	-
DMI316	Film Animation	3		Face-to-Face	1	4	-
DMI517	Creative Design Studio	3		Face-to-Face	1	4	-
DMI418	Digital Media Technology	3		Face-to-Face	1	4	-
DMI311	Multimedia Software	3		Face-to-Face	1	4	-
DES432	Design Visualization	3		Face-to-Face	1	4	-
DMI313	Design Psychology	3		Face-to-Face	3	0	-
DMI415	Special Topics in Design	3		Face-to-Face	2	2	DES225
DMI474	Human-Computer Interaction	3		Face-to-Face	3	0	CS214, CS2140
CS358	Multimedia Systems Design	3		Face-to-Face	3	0	CS223, EE317
CS481	Special Topics in Computer Graphics	3		Blended	3	0	CS332
CS482	Special Topics in Software Engineering	3		Blended	3	0	CS342
CS4833	Special Topics in Applied Computer Science	3		Blended	3	0	CS222, CS223
CS4832	Special Topics in Applied Computer Science	2		Face-to-Face	2	0	CS222, CS223
CS4831	Special Topics in Applied Computer Science	1		Face-to-Face	1	0	CS222, CS223
CS484	Special Topics in Database Technologies and Applications	3		Face-to-Face	3	0	CS363
DMI388	Special Topics in Game Programming	3		Face-to-Face	3	0	CS254
DMI389	Special Topics in Design and Media Informatics	3		Face-to-Face	3	0	-
Total		69			54	30	

^bXXXX0000 International Internship is a prerequisite for all elective courses

VII. Study Plan^c Guide for the bachelor's degree in Design and Media Informatics

First Year				
First Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
ENGL101	English III	1	ENGL099	
GERL101	German I	3		
NE101	National Education	3		
CS116	Computing Fundamentals	3		
CS1160	Computing fundamentals lab	1		CS116
ARC111	Fundamentals of Design I	4		
DES130	Freehand Sketching I	2		
MATH101	Calculus I	3	MATH099	
		Total	20	

First Year				
Second Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
ENGL102	English IV	1	ENGL101	
GERL102	German II	3	GERL101	
MATH102	Calculus II	3	MATH101	
CS214	Object-Oriented Programming	3	CS116, CS1160, ARB099, ENGL099, MATH099	
CS2140	Object-Oriented Programming Lab	1	ARB099, ENGL099, MATH099	CS214
DES151	Principles of Photography	2	ARC111	
DMI111	Visual Design Tools	3	ARC111	
DMI112	Fundamentals of Digital Media and Design	4	CS116, CS1160	
		Total	20	

^c The following study plan guide assumes having passed all placement tests

Second Year				
First Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
GERL201	German III	3	GERL102	
EE317	Linear Algebra	3	MATH101	MATH102
CS254	Visual Programming	3	CS214, CS2140	
CS222	Theory of Algorithms	3	CS116, CS1160, ARB099, ENGL099, MATH099	
CS223	Data structures	3	CS116, CS1160, ARB099, ENGL099, MATH099	
DES224	History of Visual Communication Design	3	DMI112, ARB099, ENGL099, MATH099	
DES131	Typography/ Latin	3	DMI111, DMI112	
		Total	21	

Second Year				
Second Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
GERL202	German IV	3	GERL201	
ENGL201	English V	2	ENGL102	
CS363	Database Management Systems	3	CS223, DMI280	
CS451	Artificial Intelligence	3	CS222, CS223	
DES225	Theory of Visual Communication Design	3	DES224	
DMI333	Web and Application Design	3	CS254, DMI111, DMI112	
DMI234	3D Modeling	3	DES130, DMI111, ARB099, ENGL099, MATH099	
		Total	20	

Third Year				
First Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
GERL301	German V	3	GERL202	
ENGL202	English VI	2	ENGL201	
ARB100	Arabic	3	ARB099	
DMI473	Game Programming	3	CS254, CS223	
DMI475	Virtual and Augmented Reality	3	CS254, CS223	
CS332	Computer Graphics	3	CS223, EE317	
	University Elective	3		
Total		20		

Third Year				
Second Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
CS477	Mobile Computing	3	CS254, CS363, DMI333	
CS330	Image Understanding	3	CS223, EE317	
DMI435	Animation	3	CS332, DMI234	
DMI320	Design Thinking and Methodology	3	Completion of 90 Cr. Hr.	
CS355	Web Technologies	3	CS254, CS363	
GERL302	German VI	3	GERL301	
	University Elective	3		
Total		21		

Third Year				
Third Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
DMI390	Field Training *	0	Completion of 90 C.H.	
Total		0		

* Students must complete 160 hours of practical training in approved industries in Jordan by the end of their third academic year.

Fourth Year				
First Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
	elective course	3		
	elective course	3		
	elective course	3		
	elective course	3		
		Total	12	

Fourth Year				
Second Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
	International Internship ^d	12	DMI390	
		Total	12	

Fifth Year				
First Semester				
Course ID	Course Name	Cr Hr	Prerequisites	Co-requisites
DMI434	UX/UI Design	3	CS254, DMI333	
DMI436	Game Design	3	DMI435, CS473	
DMI592	Senior Project	3	DES320 and Completion of 90 C.H.	
MILS100	Military Sciences	3		
		Total	12	

German year prerequisites are:

1. A minimum GPA of 61.0%
2. Successful completion of 90 credit hours excluding all German language courses
3. Passing GERL302 German VI and B1 German language test (all 4 language skills) conducted by Goethe Institute or another approved provider
4. ENGL201 English V, and Arabic 99
5. Passing out following courses:
 - ARC111, Fundamentals of Design I
 - DES130, Freehand Sketching I
 - DMI111, Visual Design Tools
 - DMI112, Fundamentals of Digital Media and Design
 - DMI333, Web and Application Design
 - CS223 Data Structures
 - CS254 Visual Programming
 - CS355 Web Technologies

^dCourses attended and/or passed during International Internship are not transferable

VIII. Compulsory Courses Offered by the Department of Computer Science or the Department of Design and Visual Communication

CS116: Computing Fundamentals	3 Cr Hr (3,0)	3 ECTS
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Basic computer skills, programming concepts, algorithms, variables and data types; arithmetic, logical, relational, Boolean, and assignment operators; simple input and output statements, selection structures, loop structures, single and multidimensional arrays, character strings, functions, data structures, pointers, input/output file operations.

Prerequisites: -

CS1160: Computing Fundamentals Lab	1 Cr Hr (0,3)	3 ECTS
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Lab session every week to offer hands-on experience on the topics that are covered in CS116, which are: algorithms, variables and data types; arithmetic, logical, relational, Boolean, and assignment operators; simple input and output statements, selection structures, loop structures, single and multidimensional arrays, character strings, functions, data structures, pointers, input/output file operations.

Co-requisites: CS116

CS214: Object-Oriented Programming	3 Cr Hr (3,0)	3 ECTS
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Object Oriented Programming concepts, Classes, objects and data abstraction, Constructors and destructors; Object-oriented design, encapsulation and information hiding, abstraction and modularization, coupling and cohesion, sample design patterns; inheritance, class and type hierarchies, polymorphism, Abstract classes, Interfaces, Packages, Collection classes, Generics, streams and files, exception handling; unit testing and debugging, Application Programming Interfaces, Javadoc.

Prerequisites: CS116, CS1160, ARB099, ENGL099, MATH099

CS2140: Object-Oriented Programming Lab	1 Cr Hr (0,3)	3 ECTS
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Lab session every week to enhance hands-on experience on topics that are theoretically covered in CS214, which are: Object Oriented Programming concepts, classes, objects and data abstraction, Constructors and destructors; Object-oriented design; encapsulation and information hiding, abstraction and modularization, coupling and cohesion, sample design patterns, inheritance class and type hierarchies, polymorphism, Abstract classes, Interfaces, Packages, Collection classes, Generics, streams and files, exception handling, unit testing and debugging, Application Programming Interfaces, Javadoc.

Prerequisites: ARB099, ENGL099, MATH099, Co-requisites: CS214

CS222: Theory of Algorithms	3 Cr Hr (3,0)	3 ECTS
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Complexity bounds and asymptotic analysis, standard complexity classes, empirical measurements of performance, time and space tradeoffs in algorithms, mathematical analysis of recursive and non-recursive algorithms, algorithm design strategies, backtracking algorithms, dynamic programming, sorting algorithms, string matching, graph algorithms, optimization algorithms.

Prerequisites: CS116, CS1160, ARB099, ENGL099, MATH099

CS223: Data Structures	3 Cr Hr (2,2)	4 ECTS
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Advanced C language applications (Structures, Pointers), Lists, stacks and queues; hash tables; binary search trees; balanced trees, B-Trees, graphs; depth- and breadth-first traversals; shortest- path algorithms; transitive closure; minimum spanning tree; topological sort; implementation strategies for data structures; strategies for choosing the right data structure.

Prerequisites: CS116, CS1160, ARB099, ENGL099, MATH099

CS332: Computer Graphics	3 Cr Hr (2,2)	4 ECTS
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Basic concepts of computer graphics, general features of graphics hardware, raster graphics versus vector graphics, drawing primitive objects: lines, poly-lines, polygons, circles, ellipses, curves; filling methods: scan-line fill and flood fill; Basic two-dimensional (2D) geometric transformations: translation, rotation, scaling and reflection; 2D composite transformations, 2D viewing: clipping window and windowing transformation; basic three-dimensional (3D) geometric transformations: translation, scaling, rotation and reflection; composite 3D geometric transformations, viewing a 3D scene: setting a 3D viewing-coordinate reference, transformation from world to viewing coordinates; projection transformations, 3D object representations: lines, planes, polyhedral, curved surfaces, spheres, ellipsoids; visible-surface detection methods, illumination models and surface-rendering methods, shadow mapping, transparency and surface rendering, interactive graphics.

Prerequisites: CS223, EE317

CS363: Database Management Systems	3 Cr Hr (2,2)	4 ECTS
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DBMS Architecture, Storage Hierarchy, Indexes, Entity-relationship (E-R) modeling, The relational model, Relational Query Language (SQL), Query processing and optimization, Creation and manipulation of databases; Indices and views; Access rights management; Programming in SQL; Transaction Processing (Transactional properties, Concurrency control, Locking, and Crash recovery); Data dictionaries; Required software tools: A main-stream commercial DBMS such as MS SQL, Oracle.

Prerequisites: CS223, DMI280

CS330: Image Understanding	3 Cr Hr (2,2)	4 ECTS
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This course is an introduction to fundamental concepts in image understanding. This course explores several algorithms for extracting useful semantic content from image data. In general, the course theme spans over three main topics: image processing, features and matching, geometry in vision, and recognition. In particular, the course will include algorithms and techniques related to linear filters, edge detection, image pyramids, SIFT, Harris Corner detection, feature selection, camera models, homography, stereo vision, image search, fast retrieval, image classification, objection detection, HOG detector.

Prerequisites: CS223, MATH203

CS254: Visual Programming	3 Cr Hr (2,2)	4 ECTS
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This course explores topics in Visual programming fundamentals; This course aims to introduce the students who have built a solid background in console systems to the concepts of Visual/GUI design using structured and OO programming skills acquired in previous courses. Topics include Windows Forms and Controls, Event-Driven Programming, Error Handling, Files, Multi-threading; Animation and graphics; Database connectivity. The practical part of this course will focus on training the students on various visual programming development kits, e.g., .NET framework. The course also includes a project, which brings together students coding, and user-interface design principles.

Prerequisites: CS214, CS2140

CS355: Web Technologies	3 Cr Hr (2,2)	4 ECTS
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This course explores topics in Internet and Web technology; Mobile components; Event handling: detection, notification, and response; Web applications development; Standard web services and protocols: WSDL, and UDDI, and SOAP; Design of web services and applications within a service-oriented architecture; Web application languages: HTML, XML, and scripting languages; Programming techniques for consumption and implementation of web services; Server web applications; Java servlets, and Java Server Pages; PHP basics; PHP forms and sessions; Databases connection with SQL and PHP. The practical part of this course will focus on training the students on various web development tools, like HTML, XML, and PHP.

Prerequisites: CS254, CS363

CS477: Mobile Computing	3 Cr Hr (2,2)	3 ECTS
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An introduction to mobile computing with a strong emphasis on application development for the Android operating system. Topics will include Introduction to Android IDE, Layout & Activity, Preference and Service Menu, Thread (message), Thread (progress, post, broadcast, & Intent filter), Notification, Dynamic layouts, TTS, and clocks SQLite. This course will cover mobile phone programming components like UI programming, data management, localization, and programming sensors like the accelerometer and compass, and mobile OS services. The course will focus on the Android platform and how to use cloud services in applications. Android tablets will also be given.

Prerequisites: CS254, CS363

CS451: Artificial Intelligence	3 Cr Hr (3,0)	3 ECTS
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Mathematical principles of AI; introducing several AI approaches and techniques and their underlying mathematical/algorithmic structure. Problems; problem spaces, and search. Heuristic search techniques, simulated annealing, genetic algorithms and Tabu search. Knowledge representation and logic; Constraint logic programming; Statistical reasoning; Fuzzy set theory and reasoning; Neural networks.

Prerequisites: CS222, CS223

DMI475: Virtual and Augmented Reality	3 Cr Hr (2,2)	4 ECTS
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VR systems: Discipline, features, Architecture. VR hardware: tracking systems, motion capture systems, visual displays. Fundamentals of the human visual system. Haptic rendering: Haptic sense. Haptic devices. Algorithms for haptic rendering. VR software development: Challenges in VR software development. Windowing, viewing, input/output, networking. Master/slave and Client/server architectures. Cluster rendering. Game Engines. Publically available sdk for different hardware (HTC VIVE, Oculus, Google VR). AR software development: AR software. Camera parameters and camera calibration. Marker-based augmented reality. Pattern recognition. AR Toolkits.

Prerequisites: CS254, CS223

DMI473: Game Programming	3 Cr Hr (2,2)	4 ECTS
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This course is a comprehensive introduction to the wide variety of topics within game programming, physics of games and AI in games. Primary learning outcomes of this course include a) using the Unity Editor to create exciting game levels, b) understanding the fundamentals of using 2D and 3D graphics, c) creating game scripts (e.g., using C++ and the Unity API), d) becoming acquainted with advanced topics such as shaders, physics, AI, and Network based games, and c) understanding the process of game development from idea to beta version.

Prerequisites: CS254, CS223

DMI434: UX/UI Design	3 Cr Hr (3,0)	3 ECTS
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A project-based course that introduces students to design thinking, practices, processes, concepts and tools used in UX/UI design. This course provides the basics to key theoretical concepts - user experience design, user-centred design, human-computer interaction and digital design approaches - providing an opportunity to put these principles into practice. The course will cover individual and group ideation techniques; and contemporary perspectives on interactive design for common platforms (e.g., web, desktop, tablet, mobile, and beyond). Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: CS254, DMI333

DMI111: Visual Design Tools	3 Cr Hr (0,6)	3 ECTS
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This course introduces students to a computer-based, digital approach to visual communication design. Students will learn about vector and raster graphics, how to design with specific audiences in mind, and edit images using some of the most commonly used photo editing software in the visual design industry. The course further addresses hands-on experience using

software packages to create 2D/3D graphics, sound, animation, and video. Students will study the latest software packages for visual communication design.

Prerequisites: ARC111

DMI112: Fundamentals of Digital Media and Design	3 Cr Hr (0,6)	3 ECTS
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A project-based course; it will introduce students to the basic concepts, components and practices of image making and design for digital media, with a focus towards the principles of screen-based illustration, animation and graphic design. Students will investigate the relationship between composition and form through a series of projects that will establish a fundamental understanding of digital visual communication. The course explores visual communication design fundamentals such as color theory and typography, layout techniques, web graphic optimization, motion graphics, user interface and production techniques for web and mobile. students will examine the use of social media, digital media in advertising, digital media on the World Wide Web, gaming and simulations, and digital music and movies. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: CS116, CS1160

DES130: Freehand Sketching I	2 Cr Hr (0,4)	3 ECTS
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This course teaches students perspectives of observation; perception of solids and voids in space; objective recording of three-dimensional form onto flat surface representing a two-dimensional visual frame; drawing in various media: pencil, ink, watercolor, etc; and textural and tonal qualities introduced and enhanced through freehand sketching. Students will produce sketchbooks.

Prerequisites: -

DES151: Principles of Photography	2 Cr Hr (1,2)	3 ECTS
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The course introduces students to basic photographic principles and concepts and the difference between human perception and photographic image, reflecting such aspects as subjectivity and objectivity. A major emphasis is placed on improving visual awareness and producing artistically engaging and technically competent images. The course will familiarize the student with digital photographic equipment, materials, methods, and processes. Visual problem-solving skills are explored through the use of the computer as the main tool for creative expression and communication.

Prerequisites: ARC111

DES224: History of Visual Communication Design	3 Cr Hr (3,0)	3 ECTS
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The course demonstrates the visual communication design (graphic and product design, cinema and TV production, multimedia, and animation), from the late 19th Century to the late 20th Century, with emphasis on the aesthetic, technical, social, economic, and institutional forces that affect visual communication design production and perception.

Prerequisites: DMI112, ARB099, ENGL099, MATH099

DES225 Theories of Visual Communication	3 Cr Hr (3,0,0)	3 ECTS
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The course examines the fundamental characteristics that differentiate visual images from other modes of communication and considers ways that visual elements convey meaning in isolation and in combination; exploration of creative processes to promote creativity: analytical-systematic methods such as morphological box, morphological matrix, and problem solution tree; intuitive-creative methods such as brainstorming, brain writing, brain floating; synectic methods (synectics, emotive word analysis, visual synectics, semantic intuition); idea markets; and, development of new creative ideas, e.g., innovative products, new brands, positioning, new advertising ideas including slogans, headlines, and visual materials; aesthetics and the related philosophy and philosophers, focusing on principles of art in general, literature, music, and visual contemporary issues. The course also emphasizes psychology and sociology in design through addressing the meaning of perception, Gestalt theory, principles of perception in visual arts, and criticism schools in visual arts.

Prerequisites: BSC001

DES131: Typography / Latin	3 Cr Hr (2,2)	3 ECTS
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The course provides a comprehensive exploration and application of Latin/ Arabic typography in a digital environment. Students will study the design and use of typography from historical to contemporary perspectives and analyze the difference between informative, staging and illustrative applications, considering different types of media and target groups and their specific communication problems. Students will explore the use of type and type-related technologies in designing for screen-based media such as the web, mobile applications, desktop software, and other screen-based interfaces. Concepts in web based typography and kinetic typography will be practiced.

Prerequisites: DMI111, DMI112

DMI333:-Web and Application Design	3 Cr Hr (1,4)	3 ECTS
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A project-based course that enables students to design websites and applications in a user-friendly and professional format. The course covers various subjects including web graphic design, interface design, user experience design, application design, page layouts, and search engine optimization. The course builds on prior foundations of graphic design with a special emphasis on composition for mobile apps and websites. From building and interactive websites, banner, apps to digital branding.

Prerequisites: CS254, DMI111, DMI112

DMI234: 3D Modeling	3 Cr Hr (1,4)	3 ECTS
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An introductory course to the techniques used for modeling, texturing, lighting, rendering, and creating 3D content for games, cinematics, visual effects, animation, and visualizations. Students will gain a thorough applied foundation in the practice of 3D modeling, rendering techniques, texture, surface mapping, and the use of camera light.

Prerequisites: DES130, DMI111, ARB099, ENGL099, MATH099

DMI435: Animation	3 Cr Hr (1,4)	3 ECTS
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A visualization hands-on course that introduces students to basic methods and various techniques used to create 2D and 3D animations in order to create various Motion Graphics and compositions that can be used in a wide range of applications such as video

editing, filmmaking, video game, animation and motion graphics. Students will understand the processes involved in the creation of 2D and 3D animation from concept to completion.

Prerequisites: CS332, DMI234

DMI436: Game Design	3 Cr Hr (1,4)	3 ECTS
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A project-based course explores the fundamentals of game design and game production. The course focuses on the communicative thinking and design as well concepts, strategies and methodologies of game theory, game simulation and interactive development. The course will tackle different game design concepts within theoretical and cultural contexts.

Prerequisites: CS473, DMI435

DES320: Design Thinking and Methodology	3 Cr Hr (3,0)	3 ECTS
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This course serves as an in-depth seminar on subjects of current interest in design and new media. The integration of theories from related disciplines in recent design debates are introduced and critical thinking is encouraged. Emphasis is placed on methodological research and the role of the designer. Students will be exposed to the design process as a tool for innovation and be able to understand and embody the dynamic mindset necessary for effective design thinking. Moreover, this course presents the concepts of objective criticism of design, finds various graphic solutions, and discusses methodologies, processes and concepts of design. This course is taught through presentations, exercises, research paper, writing, readings and discussions.

Prerequisites: Completion of 110 CH

DMI390: Field Training	0 Cr Hr (0,0)	0 ECTS
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Eight consecutive weeks of training where students must complete 160 hours of field training in approved industries in Jordan.

Prerequisites: completion of 90 credit hours

DMI491: International Internship	12 Cr Hr 36H/W	- ECTS
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Field training is a period of six month to be spent in the industry in Germany, under supervision of the academic faculty in Jordan and in Germany. Periodic reports and a final report need to be submitted for evaluation and an oral examination is required.

Prerequisites: DMI390

DMI592: Senior Project	3 Cr Hr (0,9)	9 ECTS
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Theoretical investigation and practical implementation of a special project under the supervision of an academic faculty member, detailed report as well as an oral examination are required.

Prerequisites: DES320 and Completion of 90 credit hours

IX. Elective Courses Offered by the Department of Computer Science or the Department of Design and Visual Communication

CS356: Information Security

3 Cr Hr (3,0)

3 ECTS

This course covers fundamental issues surrounding information security and privacy. Course topics include confidentiality, integrity, availability; authentication models, protection models, security kernels, secure programming, audit, intrusion detection and response, operational security issues, physical security issues, personnel security, policy formation and enforcement, access controls, information flow; legal and social issues, identification and authentication in local and distributed systems, classification and trust modeling, risk assessment, data aggregation, behavioral advertising, privacy-preserving data mining, privacy-preserving data publishing, website privacy policies and practices, and anonymous communication.

Prerequisites: CS363, BSC001

CS342: Software Engineering

3 Cr Hr (3,0)

3 ECTS

The product and the process, Software project management: Basic concepts, Software process and project metrics, Software project Planning, Risk management, Project scheduling and tracking, Quality assurance, Configuration management; Classical approaches: Waterfall and Spiral models; Object-oriented approach; Unified Modeling Language (UML); Concepts and notations of object- oriented analysis: Base concepts; Static concepts; Dynamic concepts; Object-oriented analysis: Analytical process; Analysis patterns; Static model; Dynamic model; Design notations and diagram; Design patterns.

Prerequisites: CS254, CS363

CS439: Computer Animation

3 Cr Hr (3,0)

3 ECTS

Fundamentals of Computer Animation; Applications of Computer Animation; Animation principles and types; Interpolation; Differential equations; Key frame animation; Particle dynamics and systems; Body dynamics and systems; Procedural animation; Physics-based methods; Motion capture techniques; Image morphing; Object deformation; Controlling groups of objects; Data- driven motion synthesis; Character Animation: basic motion (reaching, grasping, walking), facial animation, fluid animation, inverse kinematics, inverse dynamics; Lighting, shading, and anti- aliasing; Space-time constraints; Mathematics optimization; High-level control; Hierarchical and articulated models; Statistical models; Advanced modeling and rendering.

Prerequisites: CS332, BSC001

CS462: Database Design

3 Cr Hr (3,0)

3 ECTS

Three-level information architecture: External schema; Conceptual schema; Logical data model; DB server/user toolkit architecture: Query languages; Report writers; Query and application development tools; Data-modeling: CASE tools; Relational technology fundamentals; Components of a relational DBMS; Relational Database design; Developing the logical data model; Mapping the data model to the relational model; Entity-relationship modeling; Normalizing data to design tables:

Identifying functional dependencies; Applying rules for normalization; Implementing relational databases using a CASE tool; Physical database design; Manipulating and controlling a database using SQL; Creating views; Enforcing business rules for data integrity; Modeling in analysis and design; Creating an intelligent server; Creating informative data visualizations; Transactions and Database Security.

Prerequisites: CS363, BSC001

CS364: Information Retrieval	3 Cr Hr (3,0)	3 ECTS
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Introduction to Information Retrieval and Information Management from a user and design perspectives. The course covers formal models, evaluation and performance measurement, implementation structures and algorithms, and automatic organization of information including indexing, clustering, and NLP. Advanced topics include knowledge representation, semantic nets, fuzzy, and rough sets, web search, and internet technologies.

Prerequisites: CS363, BSC001

CS460: Data Mining	3 Cr Hr (3,0)	3 ECTS
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The course introduces students to data mining, by studying their principles, algorithms, implementation methodology, and applications. It provides a comprehensive introduction to data mining, including data selection, cleaning, coding, using different pattern recognition techniques, and reporting; and introduce students to the applications of data mining by using commercial tools for creating business applications.

Prerequisites: CS363, BSC001

CS358: Multimedia Systems Design	3 Cr Hr (3,0)	
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This course covers the state-of-the-art technology for multimedia systems. This course introduces students to different media types (e.g., images, video, audio, graphics) and how they are used to create multimedia content and systems, algorithms and standards to compress and distribute them via networked systems to a variety of end clients. In general, the course includes issues related to a) content creation: media capture and representation, methods to assemble media types to create multimedia content; b) compression / Storage: students will study algorithms, protocols architectures related to compression; and c) distribution: Aspects of wired and wireless network distribution, Quality of Service, as well as digital rights management of distributed multimedia (watermarking & encryption). For each of the above ISO and ITU standards will also be addressed - JPEG, MPEG1, MPEG2, MPEG4, H.261, H.263, H.264, G.711, G.722, mp3, AAC, Dolby AC3, THX, surround sound, etc. We will also study applications and systems around multimedia – such as database applications with metadata (MPEG-7, MPEG-21). The course's goal will also be to explain modern distributed multimedia systems that take some or all of the above components to create practical applications, e.g., multimedia authoring, digital cinema, content management, multimedia databases, etc.

Prerequisites: CS223, EE317

DMI474: Human-Computer Interaction	3 Cr Hr (3,0)	3 ECTS
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This subject is an introduction to human-computer interaction. Emphasis will be placed on understanding human behavior with computing systems, knowing how to design, and evaluate interactive software using a human-centered approach, and general knowledge of HCI design issues with multiple types of interactive software.

DMI414: Information Design	3 Cr Hr (1,4)	4 ECTS
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A project-based course integrating conceptual communicative thinking and design as well as design of brochures, flyers, newsletters, manuals, information graphics, and other user-friendly publications, in a series of focused modules. Audience-awareness, collaboration, peer critique, editing, writing, and visual design, and Info Design blog are also addressed. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: BSC001

DMI315: Interactive Design	3 Cr Hr (1,4)	4 ECTS
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It is a project-based course integrating conceptual communicative thinking and design as well as visual and audio communication, involving user actions, strategic design and the illusion of motion. Through individual approach and expression in traditional media, students experiment with the juxtaposition and sequence of design elements and imagery to develop a sense of artist-audience construct and consequence. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: BSC001

DMI316: Film Animation	3 Cr Hr (1,4)	4 ECTS
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A project-based course integrating conceptual communicative thinking and design. Students define specific production goals to explore or complete an animation project of their choosing. Emphasis is on director's conceptual, aesthetic and technical decision-making processes. Students are encouraged to share their specific areas of expertise while producing individually directed projects and helping each other in these projects. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: BSC001

DES517: Creative Design Studio	3 Cr Hr (1,4)	4 ECTS
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A project-based course that allows specialized, in-depth, or/and integrated study of a subject supplementing the various Design and Visual Communication disciplines. Student interest and instructor expertise help determine the topic. The course integrates conceptual communicative thinking and design as well as design methodology and implementation techniques. The design development process is covered from problem identification through detailed design and evaluation with emphasis on designing competitive quality outcomes. Projects will challenge students to generate new interdisciplinary possibility and explore new technical and conceptual knowledge. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: BSC001

DES517: Creative Design Studio	3 Cr Hr (1,4)	4 ECTS
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A project-based course that allows specialized, in-depth, or/and integrated study of a subject supplementing the various Design and Visual Communication disciplines. Student interest and instructor expertise help determine the topic. The course integrates conceptual communicative thinking and design as well as design methodology and implementation techniques. The design development process is covered from problem identification through detailed design and evaluation with emphasis on designing competitive quality outcomes. Projects will challenge

students to generate new interdisciplinary possibility and explore new technical and conceptual knowledge. Projects are preferably realized in co-operation with actual clients according to real-world demands.

Prerequisites: BSC001

DMI311: Multimedia Software	3 Cr Hr (1,4)	4 ECTS
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This course provides students with hands-on experience using multimedia software packages in an electronic design studio environment. Projects give students experience in exploring design and the creative application of display.

Prerequisites: BSC001

DMI412: Design Visualization	3 Cr Hr (1,4)	4 ECTS
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This course allows specialized or in-depth study of a subject supplementing the field of Design and Visual Communication. Student interest and instructor expertise help determine the topic. It will enable students to become more effective communicators with a deeper understanding of the design process. Students will have the opportunity to further explore a variety of hands-on techniques of design creation, manipulation, and construction. Through the integration of handcraft skills and digital technology, students will work on visualizing the design process from concept development to design realization whether in 2D/3D graphics, sound, animation, or video and film.

Prerequisites: BSC001

DMI412: Design Visualization	3 Cr Hr (1,4)	4 ECTS
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This course allows specialized or in-depth study of a subject supplementing the field of Design and Visual Communication. Student interest and instructor expertise help determine the topic. It will enable students to become more effective communicators with a deeper understanding of the design process. Students will have the opportunity to further explore a variety of hands-on techniques of design creation, manipulation, and construction. Through the integration of handcraft skills and digital technology, students will work on visualizing the design process from concept development to design realization whether in 2D/3D graphics, sound, animation, or video and film.

Prerequisites: BSC001

DMI412: Design Visualization	3 Cr Hr (1,4)	4 ECTS
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This course allows specialized or in-depth study of a subject supplementing the field of Design and Visual Communication. Student interest and instructor expertise help determine the topic. It will enable students to become more effective communicators with a deeper understanding of the design process. Students will have the opportunity to further explore a variety of hands-on techniques of design creation, manipulation, and construction. Through the integration of handcraft skills and digital technology, students will work on visualizing the design process from concept development to design realization whether in 2D/3D graphics, sound, animation, or video and film.

Prerequisites: BSC001

DMI313: Design Psychology	3 Cr Hr (1,4)	4 ECTS
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The course deals with how designs affect the human cognitive system. It discusses state-of-the-art theories and approaches for designing with affective situations, behaviors, expectations, and desires in mind with a strong aesthetic and creative goal in mind through research and design projects. Emphasis is based on the design process, which is informed and directed through psychology. Students through this process will learn how to apply design thinking and goals to psychology ideas. Lectures include an introduction to psychology topics of cognition and learning, memory, perception, attention, and relaxation.

Prerequisites: BSC001

CS481: Special Topics in Computer Graphics	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in computer graphics, animation, and their applications.

Prerequisites: CS332, BSC001

CS482: Special Topics in Software Engineering	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in software engineering

Prerequisites: CS342, BSC001

CS4833: Special Topics in Applied Computer Science	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in areas of applied computer science.

Prerequisites: CS222, CS223, BSC001

CS4832: Special Topics in Applied Computer Science	2 Cr Hr (2,0)	3 ECTS
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Selected state-of-the-art topics in areas of applied computer science.

Prerequisites: CS222, CS223, BSC001

CS4831: Special Topics in Applied Computer Science	1 Cr Hr (1,0)	3 ECTS
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Selected state-of-the-art topics in areas of applied computer science.

Prerequisites: CS222, CS223, BSC001

CS484: Special Topics in Database Technologies and Applications	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in database technologies and applications.

Prerequisites: CS363, BSC001

DMI388: Special Topics in Game Programming	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in game programming.

Prerequisites: CS254, BSC001

DMI389: Special Topics in Design and Media Informatics	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in media informatics.

Prerequisites: BSC001

DMI415: Special Topics in Design	3 Cr Hr (3,0)	3 ECTS
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Selected state-of-the-art topics in design.

Prerequisites: DES225, BSC001

X. Courses Offered by Other Departments at SEIT or SABE

EE317: Linear Algebra	3 Cr Hr (3,0)	3 ECTS
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Systems of linear equations. Vector spaces and linear transformations. Independence, bases and dimensions, bases transformation. The fundamental four spaces. Understand a matrix as a linear transformation relative to a bases of a vector space. Orthogonality and Gram-Schmidt process. Projection and projection matrices. Linear models and least squares problems. Determinants and their properties. Eigenvalues and eigenvectors. Matrix decompositions such as LU decomposition, Eigen-decomposition, Singular Value Decomposition. Vector and matrix derivatives. Applying these tools in a wide range of engineering applications.

Prerequisites: MATH101, Co-requisites: MATH102

ARC111: Fundamentals of Design I	4 Cr Hr (0,6)	3 ECTS
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A project-based course; introduction to the basic principles of order using two-and three-dimensional compositions of basic design elements: point, line, and plane, addition and subtraction through intersection of these elements and the potential illusive volumes that make space shapes: circle, square, and triangle; spatial organization: symmetry and balance, unity, repetition and rhythm, transformation and datum; order: focality and centralization, radiality, linearity, and grid. The course will establish space explorations through movement and circulation. Additional emphasis will be on color theory, textures and tones. Class assignments will be based on abstract concepts while acquainting student with using different media and presentation techniques.

Prerequisites: -

XI. Courses offered by Other Schools

ARB099: Arabic 99	0 Cr Hr (3,0)	0 ECTS
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This course aims to develop student's ability to read, comprehend, literary analyze, grammatically analyze, linguistically analyze, poetically analyze, and rhetorically analyze texts properly. The course also includes a selection of Arabic literature in poetry and prose representing different literary ages, in addition to several common forms of writing such as scientific article, news article, and others.

Prerequisites: -

ARB100: Arabic	3 Cr Hr (3,0)	3 ECTS
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This course aims to improve the student's competence in the various linguistic skills in terms of reading, comprehension, and taste. This is achieved through the study of selected texts with

many implications that raise issues in spelling, grammar, composition, meaning, and inference, and the use of an old and modern thesaurus.

Prerequisites: **ARB099**

ENGL099: English II	0 Cr Hr (3,0)	0 ECTS
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Students will focus on English at a pre-intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. These will include such things as comparatives and superlatives, quantifiers, possessive adjectives and pronouns, vocabulary building, role-play activities for speaking, reading comprehension and writing short descriptive paragraphs.

Prerequisites: -

ENGL101: English III	1 Cr Hr (3,0)	3 ECTS
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Students will focus on English at an intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. These will include collocations, tense review, affirmative, negative statements, synonyms and antonyms, time clauses, conditionals, active and passive forms, reported speech, phrasal verbs, reading comprehension with detailed questions, vocabulary and writing developed descriptive and opinion essays.

Prerequisites: **ENGL099**

ENGL102: English IV	1 Cr Hr (3,0)	3 ECTS
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Students will focus on English at an upper-intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. Model verb review, silent letters and proper pronunciation, jobs and careers, requests and offers, more phrasal verbs with vocabulary building, relative clauses and relative pronouns, narrative tenses for writing exercises, wishes and regrets, reading and comprehending longer passages with direct and inference questions of medium difficulty, hypothesizing, and writing fully developed descriptive, argumentative and analytical essays of 350 words.

Prerequisites: **ENGL101**

ENGL 201: English V	2 Cr Hr (3,0)	3 ECTS
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Students will focus on English at an Advanced level. Students will analyze and produce 2 – 3 page essays with an emphasis on argumentation and persuasion working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Class activities include interactive lectures, small group and class discussions, informal debates, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using basic literary terms and concepts.

Prerequisites: **ENGL102**

ENGL 202: English VI	2 Cr Hr (3,0)	3 ECTS
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Students will continue to focus on English at an Advanced level. Students will analyze and produce 4 – 5 page essays emphasizing argumentative, persuasive and discursive styles of writing, working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Students will integrate the practice of critical thinking and reading into the writing process. Class activities include interactive lectures, small group and class discussions, informal debates, mini-conferences, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using stronger and more intensive literary terms and concepts than in 201.

Prerequisites: ENGL 201

ENGL 202: English VI	2 Cr Hr (3,0)	3 ECTS
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Students will continue to focus on English at an Advanced level. Students will analyze and produce 4 – 5 page essays emphasizing argumentative, persuasive and discursive styles of writing, working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Students will integrate the practice of critical thinking and reading into the writing process. Class activities include interactive lectures, small group and class discussions, informal debates, mini-conferences, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using stronger and more intensive literary terms and concepts than in 201.

Prerequisites: ENGL 201

GERL101B1: German I B1 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Comprehend very familiar, everyday expressions and very simple sentences and structures related to areas of most immediate relevance according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the Level A1.1 (beginners without pre-knowledge).
- Introduce herself/himself and others, express likes and dislikes, fill out a personal form, ask questions and give answers in present and partially in past tense, set private and semi-official appointments, describe people and things and express frequency and quantity in a very basic way both orally and in writing.
- Communicate with native speakers on a very basic level if those involved in the conversation speak slowly and clearly and are willing to support the non-native speaker.

Prerequisites: Intensive pre-course (only for 1st semester of an academic year)

GERL102B1: German II B1 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Understand and use familiar, everyday expressions and very simple sentences and structures related to areas of most immediate relevance according to the discretionary

standards in the *Common European Framework of Reference for Languages* (CEFR) at the level A1.2 (basic users).

- Introduce herself/himself and others, express likes and dislikes, fill out a personal form, ask questions and give answers in present and past tense, set private and official appointments, describe people and things, ask for directions, express frequency and quantity in a basic way both orally and in writing.
- Communicate with native speakers on a very basic level if those involved in the conversation speak slowly and clearly and, if need be, are willing to support the non-native speaker.

Prerequisites: **GERL101B1**

GERL201B1: German III B1 track	3 Cr Hr (6,0)	4 ECTS
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By the end of this module, the student will be able to:

- Understand and use familiar, frequently used expressions and simple sentences and structures related to areas of a wider immediate relevance according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level A2.1 (basic users).
- Talk about their academic and/or professional background, describe their living conditions, express likes and dislikes, ask questions and give answers in present and past tense, ask for help and support, make suggestions and give advice, describe health problems and talk with medical doctors and nurses, express pity, sorrow and hopes, express frequency and quantity in a basic way both orally and in writing.
- Communicate with native speakers within simple and familiar tasks requiring a simple and direct exchange of information on familiar and routine matters.

Prerequisites: **GERL102B1**

GERL202B1: German IV B1 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Distinguish between familiar expressions, sentences and structures related to areas of immediate relevance and more elaborated components like the main points of clear standard input on familiar matters regularly encountered in work, school, leisure etc. according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level A2.2 (basic users) and, partially, at the level B1.1 (independent user).
- Talk about personal experiences with languages, express feelings of happiness, joy and discomfort, describe own media consumption habits, describe travel experiences, convince others, describe and report in official situations, describe statistics, write formal invitations and short emails, make suggestions and talk about future events and situations, describe dreams hopes and ambitions and briefly give reasons or explanations for opinions and plans.
- Communicate with native speakers about essential points and ideas in familiar contexts.
- Understand the characteristics of the official B1 exam according to the CEFR and use strategies to overcome obstacles while solving said exam.

Prerequisites: **GERL201B1**

GERL301B1: German V B1 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure etc. according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level B1.1 and B1.2 (independent user).
- Deal with most situations likely to arise whilst traveling in an area where German is spoken, produce simple connected texts on topic which are familiar or of personal interest, describe experiences and events, dreams, hopes and ambitions, statistics, and briefly give reasons and explanations for opinions and plans.
- Understand the main point of many radio or TV programmes on current events and topics, understand the description of events, feelings and wishes in personal letters, write personal letters/texts describing experiences and impressions, write straightforward connected texts on topics which are familiar or of personal interest.
- Communicate with native speakers about essential points and ideas in familiar contexts and about topics of personal or partially professional interest.
- Follow a lecture or talk within her/his field, provided the subject matter is familiar and the presentation straightforward and clearly structured.
- Understand simple technical information, such as operating instructions for everyday equipment.
- Understand all characteristics of the official B1 exam according to the CEFR and use a variety of strategies to overcome obstacles while solving said exam and all its components.

Prerequisites: **GERL202B1**

GERL302REG: German VI Regular	3 Cr Hr (6,0)	6 ECTS
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By the end of this module, the student will be able to:

- Successfully manage the application process for a six months internship in Germany which is part of the obligatory 'German Year' for all GJU students. The process consists of finding and understanding a suitable add in accordance with the students' major, writing a convincing CV and cover letter, and mastering an effective and mostly fluent interview, departing spontaneously, taking initiatives, expanding ideas with little help or prodding from the interviewer.
- Successfully manage the most significant situations which the student, in accordance with the currently studied major, encounters during her/his theoretical and practical semester in Germany. This process is being achieved within a technical language training focussing on action orientated and communicative scenarios like following lectures, taking notes, summarizing academic and technical texts, writing official emails and texts related to academic and vocational encounters, holding presentations, communicating both verbally and in writing with professors, university staff, students as well as with colleagues and customers during an internship.
- Understand the concept of general intercultural phenomena, reflect and understand the differences between culture and cultural standards in Jordan and in Germany, understand the concept of 'culture shock' and potentially cope with its different stages, reflect about appropriate and inappropriate behaviour in Germany as well as understand the concepts of open-mindedness and 'culture clash'.

Prerequisites: **GERL301B1**

GERL302INT: German VI Intensive	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Successfully manage the application process for a six months internship in Germany which is part of the obligatory 'German Year' for all GJU students. The process consists of finding and understanding a suitable add in accordance with the students' major, writing a convincing CV and cover letter, and mastering an effective and mostly fluent interview, departing spontaneously, taking initiatives, expanding ideas with little help or prodding from the interviewer.
- Successfully manage the most significant situations which the student, in accordance with the currently studied major, encounters during her/his theoretical and practical semester in Germany. This process is being achieved within a technical language training focussing on action orientated and communicative scenarios like following lectures, taking notes, summarizing academic and technical texts, writing official emails and texts related to academic and vocational encounters, holding presentations, communicating both verbally and in writing with professors, university staff, students as well as with colleagues and customers during an internship.
- Understand the concept of general intercultural phenomena, reflect and understand the differences between culture and cultural standards in Jordan and in Germany, understand the concept of 'culture shock' and potentially cope with its different stages, reflect about appropriate and inappropriate behaviour in Germany as well as understand the concepts of open-mindedness and 'culture clash'.
- Understand all characteristics of the official B1 exam according to the CEFR and use different strategies to overcome obstacles while solving said exam and its different components.

Prerequisites: **GERL301B1**

GERL102B2: German II B2 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Understand and use familiar, everyday expressions and simple sentences and structures related to areas of most immediate relevance according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level A1.2 and, partially, A2.1 (basic users).
- Talk about their academic and/or professional background, describe their living conditions, express likes and dislikes, ask questions and give answers in present and past tense, ask for help and support, make suggestions and give advice, express pity, sorrow and hopes, express frequency and quantity in a basic way both orally and in writing.
- Introduce herself/himself and others, express likes and dislikes, fill out a personal form, ask questions and give answers in present and past tense, set private and official appointments, describe people and things, ask for directions, express frequency and quantity in a basic way both orally and in writing.
- Communicate with native speakers on a basic level if those involved in the conversation speak slowly and clearly and, if need be, are willing to support the non-native speaker.

Prerequisites: **GERL101B1**

GERL201B2: German III B2 track	3 Cr Hr (6,0)	4 ECTS
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By the end of this module, the student will be able to:

- Distinguish between familiar expressions, sentences and structures related to areas of immediate relevance and more elaborated components like the main points of clear

standard input on familiar matters regularly encountered in work, school, leisure etc. according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level A2.1 and A2.2 (basic users).

- Talk about their academic and/or professional background, describe their living conditions, express likes and dislikes, ask questions and give answers in present and past tense, ask for help and support, make suggestions and give advice, describe health problems and talk with medical doctors and nurses, express pity, sorrow and hopes, describe simple statistics, express frequency and quantity in a basic way both orally and in writing, express feelings of happiness, joy and discomfort and write personal emails and letters, understand and produce comments, blogs and reports.
- Communicate with native speakers in simple and familiar tasks requiring a simple and direct exchange of essential information on familiar and routine matters.

Prerequisites: **GERL102B2**

GERL202B2: German IV B2 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure etc. according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level B1.1 and B1.2 (independent user).
- Deal with most situations likely to arise whilst traveling in an area where German is spoken, produce simple connected texts on topic which are familiar or of personal interest, describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
- Understand the main point of many radio or TV programmes on current events and topics, understand the description of events, feelings and wishes in personal letters, write personal letters/texts describing experiences and impressions, write straightforward connected texts on topics which are familiar or of personal interest.
- Communicate with native speakers about essential points and ideas in familiar contexts and about topics of personal or partially professional interest.
- Follow a lecture or talk within her/his field, provided the subject matter is familiar and the presentation straightforward and clearly structured.
- Understand simple technical information, such as operating instructions for everyday equipment.
- Understand all characteristics of the official B1 exam according to the CEFR and use different strategies to overcome obstacles while solving said exam and all its components.

Prerequisites: **GERL201B2**

GERL301B2: German V B2 track	3 Cr Hr (9,0)	6 ECTS
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By the end of this module, the student will be able to:

- Largely understand and produce rather complex texts on both concrete and abstract topics, including technical discussions in her/his field of specialisation and according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level B2.1 (independent user).
- Interact with an initial degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party.

- Largely understand standard spoken language, live or broadcast, on both familiar and unfamiliar topics normally encountered in personal, social, academic or vocational life.
- Show a relatively high controlled degree of grammatical control without making errors which cause misunderstanding and with the growing ability to correct most of her/his mistakes.
- Largely follow essentials of lectures, talks, reports and other forms of academic/professional presentation which are propositionally and linguistically complex.
- Understand announcements and messages on concrete and abstract topics spoken in standard dialect at normal speed.
- Scan quickly through long texts, locating relevant details and understand and exchange complex information and advice on the full range of matters related to her/his occupational role.
- Understand the main characteristics of the official B2 exam according to the CEFR and use different strategies to overcome obstacles while solving said exam and its different components.

Prerequisites: **GERL202B2**

GERL302B2: German VI B2 track	3 Cr Hr (6,0)	6 ECTS
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By the end of this module, the student will be able to:

- Understand and produce rather complex texts on both concrete and abstract topics, including technical discussions in her/his field of specialisation and according to the discretionary standards in the *Common European Framework of Reference for Languages* (CEFR) at the level B2.2 (independent user).
- Interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party.
- Understand standard spoken language, live or broadcast, on both familiar and unfamiliar topics normally encountered in personal, social, academic or vocational life.
- Show a highly controlled degree of grammatical control without making errors which cause misunderstanding and with the growing ability to correct most of her/his mistakes.
- Follow essentials of lectures, talks, reports and other forms of academic/professional presentation which are propositionally and linguistically complex.
- Understand announcements and messages on concrete and abstract topics spoken in standard dialect at normal speed.
- Scan quickly through long texts, locating relevant details and understand and exchange complex information and advice on the full range of matters related to her/his occupational role.
- Understand all characteristics of the official B2 exam according to the CEFR and use different strategies to overcome obstacles while solving said exam and its different components.
- Successfully manage the application process for a six months internship in Germany which is part of the obligatory 'German Year' for all GJU students. The process consists of finding and understanding a suitable add in accordance with the students' major, writing a convincing CV and cover letter, and mastering an effective and mostly fluent interview, departing spontaneously, taking initiatives, expanding ideas with little help or prodding from the interviewer.
- Successfully manage the most significant situations which the student, in accordance with the currently studied major, encounters during her/his theoretical and practical semester

in Germany. This process is being achieved within a technical language training focussing on action orientated and communicative scenarios like following lectures, taking notes, summarizing academic and technical texts, writing official emails and texts related to academic and vocational encounters, holding presentations, communicating both verbally and in writing with professors, university staff, students as well as with colleagues and customers during an internship.

- Understand the concept of general intercultural phenomena, reflect and understand the differences between culture and cultural standards in Jordan and in Germany, understand the concept of 'culture shock' and potentially cope with its different stages, reflect about appropriate and inappropriate behaviour in Germany as well as understand the concepts of open-mindedness and 'culture clash'.

Prerequisites: GERL301B2

BE302: Business Entrepreneurship	3 Cr Hr (3,0)	3 ECTS
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The course focuses on critical skills necessary to develop appropriate financing strategies for new venture creation and growth. Students will use case studies and team projects in course studies. Three primary topics are covered: first, an overview of the entrepreneurial finance process and involved players; second, performing business valuations; and third, securities law with emphasis on developing term sheets and private placement memorandums. Student teams will complete a valuation and mock securities offering for an existing small to mid-size business. Financial valuations and terms sheets developed by student teams will be presented to a panel of venture capital professionals for evaluation and critique

Prerequisites: English101

DES101: Arts Appreciation	3 Cr Hr (3,0)	3 ECTS
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An introductory course designed for non-art students to give them the basic knowledge of arts and simple approaches to the understanding of the history, development, elements, criticism, esthetics and materials of different art forms (visual, aural and performing arts). A comparative approach between the different arts is given to enhance the students' global understanding of arts and to give them the ability to look at art works and form their own opinions. The course is combined with examples of audio and visual arts.

Prerequisites: ARB099, ENGL101

IC101: Intercultural Communication	3 Cr Hr (3,0)	3 ECTS
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This course is designed to provide prospective students (whose majors have an international flavor) with tools that offer powerful possibilities for improving the communication process. We will examine the process of sending and receiving messages between people whose cultural background could lead them to interpret verbal and nonverbal signs differently. We will learn about the diversity of these cultural differences and at the same time learn how we might overcome them. Our efforts to recognize and surmount cultural differences will hopefully open up business opportunities throughout the world and maximize the contribution of all the employees in a diverse workforce

Prerequisites: ENGL101

MILS100: Military Science	3 Cr Hr (3,0)	3 ECTS
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History of the Jordanian Arab Army. United Nations Peace Keeping Forces. Preparation of the nation for defense and liberation. History of the Hashemite Kingdom of Jordan and its development

Prerequisites:

NE101: National Education **3 Cr Hr (3,0)** **3 ECTS**

In a context of striving towards democracy like the one Jordan enjoys today, the meaning and practice of active and responsible citizenship becomes more crucial. It is often argued that democracy requires “democrats” to flourish, and become well established. Democrats are those women and men who recognize pluralism, inclusion, positive engagement, and participation as the main values that govern their interaction with the state as citizens and with each other as diverse people of different interests. In this course you will be able to understand your rights and responsibilities as Jordanian citizen expand your knowledge about the frameworks, and processes that regulates citizen-state relationships as well as the basic necessary skills for you to practice your citizenship rights in a civic manner.

Prerequisites:

SE301: Social Entrepreneurship and Enterprises **3 Cr Hr (3,0)** **3 ECTS**

This course will serve as an introduction to the field of social entrepreneurship and social enterprises.

Through lectures, field visits, analyses of relevant literature, case studies and exercises, this course will explore social entrepreneurship’s potentials, opportunities and limitations. The topics will cover Defining Social Entrepreneurship. Contextualizing Social Entrepreneurship (need, motives, forms, criteria). Role of Leadership, Creativity and Innovation. Locating SE on the profit/non-profit continuum. SE in the larger fields of development, social change, community activism. Social Enterprises (Missions, Markets, Finances). Ethical business and corporate social responsibility.

Prerequisites: **ENGL101**

SFTS101: Soft Skills **3 Cr Hr (3,0)** **3 ECTS**

This course is designed to help develop strong oral and written communication skills. The student will be given opportunities to practice writing and editing professional correspondence and technical reports. Additionally, the student will compose and deliver oral presentations. Assignments will include the use of inductive and deductive approaches to conveying a variety of messages. The course emphasis the use of software tools to prepare presentations, stress management, confidence, and sensitivity to others. It also stresses on resume writing and conducting interviews.

Prerequisites: **ENGL101**

MATH101: Calculus 1 **3 Cr Hr (3,0)** **3 ECTS**

This course introduces the student to the calculus of single-valued functions. Topics include: limits, continuity, rates of change, rules for differentiating, differentials and local linear

approximations, maxima and minima problems, L'Hôpital's rule, related rates, logarithmic and implicit differentiation, inverse trigonometric and hyperbolic functions, Rolle's Theorem, the mean-value theorem, and applications of derivatives and integrals. An overview of integration, basic techniques for integration, algebraic techniques of integration and applications of integrations are also included.

Prerequisites: MATH099

MATH102: Calculus 2

3 Cr Hr (3,0)

3 ECTS

Sequences and series, power series, convergence theorems: integral, ratio, and alternating - series tests, Polar coordinates, and functions, integration and differentiation of polar functions, Vectors in three-dimensional space, spherical and cylindrical coordinates, Vector-valued functions, Partial derivatives, Multiple integrals, Topics in vector calculus.

Prerequisites: MATH101

GERL301: German V

3 Cr Hr (9,0)

6 ECTS

Can understand and also seize implicit meanings of a broad spectrum of demanding, longer texts. Can express oneself spontaneously and fluidly, recognizing words without having to search for words frequently. Can use the language effectively and flexibly in social and vocational life or in training and study. Can express oneself clearly, structured and detailed, to complex subjects and use appropriate different means for linkage of texts.

Prerequisites: GERL 202

GERL202: German IV

3 Cr Hr (9,0)

6 ECTS

Can understand the main contents of complex texts, as well as concrete and abstract topics; even discussions between specialists in his/ her own special field. Can communicate spontaneously and fluidly a normal discussion with native speakers, without larger effort on both sides. Can express oneself clearly and in detail in a broad spectrum of topics, describe a point of view to a current question and indicate the pro and cons of different possibilities.

Prerequisites: GERL 201

GERL201: German III

3 Cr Hr (9,0)

6 ECTS

Can understand the main points if no dialect is used and if it concerns familiar things about work, school, spare time etc. Can master most situations which one encounters on journeys in a German speaking area. Can express oneself simply and coherently about familiar topics and areas of personal interest. Can report experiences and events, describe dreams, hopes and goals and give short reasons or explanations about plans and opinions.

Prerequisites: GERL 102