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| --- |
| For Academic Affairs and Research Use Only |
| Proposal Number |  |
| CIP Code:  |  |
| Degree Code: |  |

**Reconfiguration of Existing Degree Program Proposal Form**

(Also requires Arkansas Department of Higher Education (ADHE) approval)

**[X] Undergraduate Curriculum Council**

**[ ] Graduate Council**

Signed paper copies of proposals submitted for consideration are no longer required. Please type approver name and enter date of approval.

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| Jason L. Causey | 10/8/2020 |

**Department Curriculum Committee Chair** |

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**COPE Chair (if applicable)** |
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| Abhijit Bhattacharyya | 10/8/2020 |

**Department Chair** |

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**Head of Unit (if applicable)**   |
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| Summer DeProw | 9/25/2020 |
| **Office of Assessment** |  |

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**Undergraduate Curriculum Council Chair** |
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| Jason Stewart | 10/8/2020 |

**College Curriculum Committee Chair** |

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**Graduate Curriculum Committee Chair** |
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| Abhijit Bhattacharyya | 10/8/2020 |

**College Dean** |

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**Vice Chancellor for Academic Affairs** |
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**General Education Committee Chair (if applicable)**   |  |

1. **Contact Person** (Name, Email Address, Phone Number)

 Jason Causey jcausey@astate.edu , (870) 972-3978 ext. 8182

1. **Title(s) of degree programs to be consolidated/reconfigured:**

Computer Science, Mathematics and Statistics

1. **Proposed title of consolidated/reconfigured program:**

BS in Data Science and Data Analytics

1. **Proposed Effective Date:** Fall 2021
2. **Reason for proposed program consolidation/reconfiguration:**

*(Indicate student need/demand (projected enrollment) for the proposed program and document that the program meets employer needs using the ADFA Workforce Analysis Form)*

There is a large and expanding need for data scientists and data analysts within the state. This was underscored by Governor Asa Hutchinson in 2017 by the creation of a Blue Ribbon Commission on Data Analytics and Computing. The Commission’s Executive Summary and full report can be found at <https://www.acds.co/blueribbon> . The commission recommended the launch of a $25 million public-private, nonprofit entity to address business challenges in data analytics and computing, as well as focus on workforce development in those fields. Various workforce analyses conducted across the state underscore the significant need for data scientists and analysts. As a result of the Commission’s report and various workforce analyses, the [Arkansas Center for Data Sciences](https://www.acds.co/) (https://www.acds.co/) was established to transform existing industries through the integration of technical and business skills, the advancement of talent pipelines, and ongoing upgrades to relevant workforce skills.

1. **Provide current and proposed curriculum outline by semester.**

*For undergraduate programs, please use Appendix A-8-semester plan form*

 *Indicate total semester credit hours required for the proposed program. If new courses are needed for the reconfiguration, approval for the courses must be requested prior to approval for the new degree. Underline any new courses. Identify required general education core courses with an asterisk. If utilizing courses from other departments, please color-code them and provide a key.*

 The creation of the Bachelor of Science in Data Science and Data Analytics involved six colleges – Agriculture, Education and Behavioral Science, Engineering and Computer Science, Liberal Arts and Communication, Nursing and Health Professions, and Sciences and Mathematics. The curriculum includes a program core (40 hours) and two tracks—Data Science and Data Analytics. The program core, which focuses on statistics, computer programming, data visualization, data governance and ethics, will be required of all majors. The two tracks - Data Science and Data Analytics – will provide further depth beyond the program core. Within each track, students will be required to complete courses within their particular area of interest or “domain”. Approval for the courses in each domain will be the responsibility of the interdisciplinary program governing body. Domains could include social sciences, healthcare, geospatial technologies, engineering, computer science, or bioinformatics to name a few. Each track (including the domain study) will require 45 hours.

The domain studies, proposed by participating colleges, will conform to the following parameters:

1. All courses proposed as part of domain studies will have to be existing courses or courses proposed as part of other academic programs in the university

2. Domain studies affiliated with the Data Science track are limited to 21 hours of which 7 hours are upper level.

3. Domain studies affiliated with the Data Analytics track are limited to 32 to 33 hours of which 10 hours are upper level.

Due to the complexity of the program, two sample 8-semester plans, one for Data Science and the other for Data Analytics – have been included.

1. **Will the proposed degree be offered:**
	1. **Traditional/Face-to-face** Yes
	2. **Distance/Online** Yes
		1. **If yes, indicate mode of distance delivery, and the percentage of courses offered via this modality (<50%, 50-99%, or 100%).**

50-99% (Modality of program delivery is on-campus. Any changes to the modality will not happen without the approval of the program steering committee, participating departments and the participating colleges.)

* + 1. **If online, will it be offered through Global Initiatives/Academic Partnerships (AP)?**

No

1. **Will the proposed degree be offered off-campus?** No
	1. **If yes, identify the off-campus location**

 Enter text...

1. **Provide documentation that proposed program has received full approval by licensure/certification entity, if required.**

 *(A program offered for teacher/education administrator licensure must be reviewed/approved by the Arkansas Department of Education prior to consideration by the Coordinating Board; therefore, the Education Protocol Form also must be submitted to ADHE along with the Letter of Notification).*

N/A

1. **List institutions offering similar program and identify the institutions used as a model to develop the proposed program.**

University of Arkansas at Fayetteville (BS in Data Science) has been used as a model. Other programs in Arkansas include

BS in Business Administration in Business Analytics, Arkansas Tech University

Other related programs in Arkansas can be found at <https://www.datascienceprograms.org/in/arkansas>.

1. **Provide scheduled program review or specialized accreditation initial review date (within 10 years of program implementation).**

Fall 2030

1. **Is there differential tuition requested?** *If yes, please fill out the New Program/Tuition and Fees Change Form.*

Yes.

**Student Learning Outcomes**

Provide outcomes that students will accomplish during or at completion of this reconfigured degree. Fill out the following table to develop a continuous improvement assessment process.

*For further assistance, please see the ‘Expanded Instructions’ document available on the UCC - Forms website for guidance, or contact the Office of Assessment at 870-972-2989.*

**University Outcomes**

Please indicate the university-level student learning outcomes for which this new program will contribute. Please complete the table by adding program level outcomes (PLO) to the first column, and indicating the alignment with the university learning outcomes (ULO). If you need more information about the ULOs, go to the [University Level Outcomes Website](http://www.astate.edu/a/assessment/student-learning-outcomes/files/ULOs%20for%20Website2.pdf).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **ULO 1: Creative & Critical Thinking** | **ULO 2: Effective Communication** | **ULO 3: Civic & Social Responsibility** | **ULO 4: Globalization & Diversity** |
| **PLO 1**: Identify societal and ethical impacts as well as the responsibility that come with access to data |  |  | **XX** | **XX** |
| **PLO 2:** Critically assess and remediate issues with data organization and data quality | **XX** |  |  |  |
| **PLO 3**: Design and implement a solution to a problem in the realm of data science/data analytics through problem identification, problem solving, decision making, visualization, data analysis and reporting | **XX** | **XX** |  |  |

***Note: Best practices suggest 4-7 outcomes per program; minors would have 1 to 4 outcomes.***

|  |  |
| --- | --- |
| **Outcome 1** | Identify societal and ethical impacts as well as the responsibility that come with access to data. |
| Assessment Procedure Criterion | Assessed in DATA 4013: Capstone Design.1. **Direct measure**: A hierarchical final project review panel consisting of peer, stakeholder, and faculty reviews in a rubric format.
2. **Indirect measure**: Students will complete an exit survey.
 |
| Which courses are responsible for this outcome? | DATA 2004, DATA 3003, DATA 3011, DATA 303V, DATA 4013 |
| Assessment Timetable | Assessment data is gathered at the end of each semester in which the DATA 4013 capstone course is offered; review occurs on an annual basis. |
| Who is responsible for assessing and reporting on the results? | Instructor of record for DATA 4013 directs final project review, collects rubrics from the panel, and collates the results. Program director reviews results and reports to the Program Steering Committee. Program director may recommend changes, to be approved by the Steering Committee, or changes may be recommended by the Steering Committee directly. |

|  |  |
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| **Outcome 2** | Critically assess and remediate issues with data organization and data quality |
| Assessment Procedure Criterion | Assessed in DATA 4013: Capstone Design.1. **Direct measure**: A hierarchical final project review panel consisting of peer, stakeholder, and faculty reviews in a rubric format.
2. **Indirect measure**: Students will complete an exit survey.
 |
| Which courses are responsible for this outcome? | DATA 2004, DATA 3003, DATA 4013 |
| Assessment Timetable | Assessment data is gathered at the end of each semester in which the DATA 4013 capstone course is offered; review occurs on an annual basis. |
| Who is responsible for assessing and reporting on the results? | Instructor of record for DATA 4013 directs final project review, collects rubrics from the panel, and collates the results. Program director reviews results and reports to the Program Steering Committee. Program director may recommend changes, to be approved by the Steering Committee, or changes may be recommended by the Steering Committee directly. |

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| **Outcome 3** | Design and implement a solution to a problem in the realm of data science/data analytics through problem identification, problem solving, decision making, visualization, data analysis and reporting |
| Assessment Procedure Criterion | Assessed in DATA 4013: Capstone Design.1. **Direct measure**: A hierarchical final project review panel consisting of peer, stakeholder, and faculty reviews in a rubric format.
2. **Indirect measure**: Students will complete an exit survey.
 |
| Which courses are responsible for this outcome? | DATA 2004, DATA 3023, DATA 4003, DATA 4013 CSED 4231, CSED 4241, CSED 4731 |
| Assessment Timetable | Assessment data is gathered at the end of each semester in which the DATA 4013 capstone course is offered; review occurs on an annual basis. |
| Who is responsible for assessing and reporting on the results? | Instructor of record for DATA 4013 directs final project review, collects rubrics from the panel, and collates the results. Program director reviews results and reports to the Program Steering Committee. Program director may recommend changes, to be approved by the Steering Committee, or changes may be recommended by the Steering Committee directly. |

*Please repeat as necessary.*

**Appendix A, 8-Semester Plan**

(**Referenced in #9** - **Undergraduate Proposals Only)**

*Instructions: Please identify new courses in italics*.

Two sample plans are listed here: one is for the Data Science track and the other is for the Data Analytics track.









**Bulletin Changes**

|  |
| --- |
| **Instructions**  |
| **Please visit** [**http://www.astate.edu/a/registrar/students/bulletins/index.dot**](http://www.astate.edu/a/registrar/students/bulletins/index.dot) **and select the most recent version of the bulletin. Copy and paste all bulletin pages this proposal affects below. Please include a before (with changed areas highlighted) and after of all affected sections.** **\*Please note: Courses are often listed in multiple sections of the bulletin. To ensure that all affected sections have been located, please search the bulletin (ctrl+F) for the appropriate courses before submission of this form.**  |

**From the 2020-2021 undergraduate catalog**

**From Page 62**

**Before:**

**Bachelor of Science (B.S.)**

|  |
| --- |
| Accounting |
|  Biological Sciences (emphasis in): —Biology—Botany—Pre-professional Studies —Zoology |
| Biotechnology |
| Business Administration—Sustainable Business Practices |
| Business Economics |
| Chemistry:—Pre-Health Profession Studies |
| Clinical Laboratory Science |
| Communication Disorders |
| Computer and Information Technology |
| Computer Science |
| Creative Media Production (emphasis in):—Corporate Media—Graphic Communication—Sports Media |
| Dietetics |
| Digital Innovations (emphasis in):—Graphic Communications—Strategic Communications |

**After:**

**Bachelor of Science (B.S.)**

|  |
| --- |
| Accounting |
|  Biological Sciences (emphasis in): —Biology—Botany—Pre-professional Studies —Zoology |
| Biotechnology |
| Business Administration—Sustainable Business Practices |
| Business Economics |
| Chemistry:—Pre-Health Profession Studies |
| Clinical Laboratory Science |
| Communication Disorders |
| Computer and Information Technology |
| Computer Science |
| Creative Media Production (emphasis in):—Corporate Media—Graphic Communication—Sports Media |
| Data Science and Data Analytics |
| Dietetics |
| Digital Innovations (emphasis in):—Graphic Communications—Strategic Communications |

**From Page 64 (list of certificates)**

**Before:**

|  |
| --- |
| Bone Densitometry  |
| Cardiovascular-Interventional Technology\* |
|  Computed Tomography |
| Corporate Media |
| Debate and Forensics |
| DIagnotics Medical Sonography\* |
| Digital Humanities |
| Emergency Medical Technician |
| Free Enterprise |
| Graphic Communication |
| Health Coaching |
| Information Technology |
| Leadership Studies |
| Mammography\* |
| Marketing Analytics |

**After:**

|  |
| --- |
| Bone Densitometry  |
| Cardiovascular-Interventional Technology\* |
|  Computed Tomography |
| Corporate Media |
| Data Analytics |
| Debate and Forensics |
| DIagnotics Medical Sonography\* |
| Digital Humanities |
| Emergency Medical Technician |
| Free Enterprise |
| Graphic Communication |
| Health Coaching |
| Information Technology |
| Leadership Studies |
| Mammography\* |
| Marketing Analytics |

**From Page 80**

**Before:**

**COLLEGE OF ENGINEERING AND COMPUTER SCIENCE**

Department of Computer Science

Program for Civil Engineering

Program for Electrical Engineering

Program for Mechanical Engineering

Program for Engineering Technology

**After:**

**COLLEGE OF ENGINEERING AND COMPUTER SCIENCE**

Department of Computer Science

Program for Civil Engineering

Program for Data Science and Data Analytics

Program for Electrical Engineering

Program for Mechanical Engineering

Program for Engineering Technology

**From Page 180**

**Before:**

College of Engineering and Computer Science

Professor Abhijit Bhattacharyya, Dean

Associate Professor Yeonsang Hwang, Associate Dean

PROGRAMS OF STUDY The College of Engineering and Computer Science offers undergraduate degree programs in a broad spectrum of areas, including a Bachelor of Arts degree in Computer Science; a Bachelor of Science degree in Computer Science; a Bachelor of Science in Civil Engineering degree; a Bachelor of Science in Electrical Engineering degree; a Bachelor of Science and Associate of Applied Science in Land Surveying and Geomatics; a Bachelor of Science in Mechanical Engineering degree; and a Bachelor of Science and an Associate of Science in Engineering Technology degree. Minors are also available in Computer Science, Land Surveying and Geomatics, Engineering and Renewable Technology.

The College of Engineering and Computer Science grants a wide-range of master’s degree (M.E.M., M.S., M.S.E., M.S.Engr.) programs and multiple graduate certificates. For further information, see AState’s Graduate Bulletin.

The college is comprised of one department and three programs:

Department of Computer Science

Program for Civil Engineering

Program for Electrical Engineering

Program for Mechanical Engineering

Program for Engineering Technology

**After:**

College of Engineering and Computer Science

Professor Abhijit Bhattacharyya, Dean

Associate Professor Yeonsang Hwang, Associate Dean

PROGRAMS OF STUDY The College of Engineering and Computer Science offers undergraduate degree programs in a broad spectrum of areas, including a Bachelor of Arts degree in Computer Science; a Bachelor of Science degree in Computer Science; a Bachelor of Science in Civil Engineering degree; a Bachelor of Science degree in Data Science and Data Analytics; a Bachelor of Science in Electrical Engineering degree; a Bachelor of Science and Associate of Applied Science in Land Surveying and Geomatics; a Bachelor of Science in Mechanical Engineering degree; and a Bachelor of Science and an Associate of Science in Engineering Technology degree. Minors are also available in Computer Science, Land Surveying and Geomatics, Engineering and Renewable Technology. An undergraduate certificate in Data Analytics is also available.

The College of Engineering and Computer Science grants a wide-range of master’s degree (M.E.M., M.S., M.S.E., M.S.Engr.) programs and multiple graduate certificates. For further information, see AState’s Graduate Bulletin.

The college is comprised of one department and five programs:

Department of Computer Science

Program for Civil Engineering

Program for Data Science and Data Analytics

Program for Electrical Engineering

Program for Mechanical Engineering

Program for Engineering Technology

**After Page 185 and before the heading on “Engineering Programs” (pg. 186).
(Before: N/A (this section is new)).
After:**

**Data Science and Data Analytics Program**

Data science and data analytics applications exist in numerous industries and government agencies. This diversity of opportunity is reflected in the interdisciplinary nature of the Data Science and Data Analytics (DSDA) Program which involves six colleges; Agriculture, Education and Behavioral Science, Engineering and Computer Science, Liberal Arts and Communication, Nursing and Health Professions, and Sciences and Mathematics. The DSDA Program builds out from the general education curriculum to a program core of 37 hours and two specific tracks from which students can choose. The program core is be required of all students in the program and covers content in Statistics, programming, visualization, data governance and ethics. The two tracks - Data Science and Data Analytics – provide further depth beyond the program core. Within each track, students will be required to complete courses within their particular area of interest or “domain”. Domains could include social sciences, healthcare, geospatial technologies, engineering, computer science, or bioinformatics to name a few. Each track (including the domain study) will require 45-46 hours.

The domain studies, proposed by participating colleges, will conform to the following parameters:

1. All courses proposed as part of domain studies will have to be existing courses or courses proposed as part of other academic programs in the university

2. Domain studies affiliated with the Data Science track are limited to 21 to 22 hours of which 7 hours are upper level.

3. Domain studies affiliated with the Data Analytics track are limited to 32 to 34 hours of which 10 hours are upper level.

The outcomes of the BS program are:

1. Identify societal and ethical impacts as well as the responsibility that come with access to data.
2. Critically assess and remediate issues with data organization and data quality.
3. Design and implement a solution to a problem in the realm of data science/data analytics through problem identification, problem solving, decision making, visualization, data analysis and reporting.

A 19-hour undergraduate certificate in Data Analytics is also available to all majors. The outcomes of the certificate are:

1. Identify societal and ethical impacts as well as the responsibility that come with access to data

2. Critically assess and remediate issues with data organization and data quality

**Major in Data Science and Data Analytics**

A complete 8-semester degree plan is available at <https://www.astate.edu/info/academics/degrees/>

|  |  |
| --- | --- |
| **University requirements:** |  |
| See University general requirements for Baccalaureate degrees (p.41) |  |
| **First Year Making Connections Course:** | **Sem. Hours** |
| Domain Dependent course\*, or CS 1093, Making Connections – Computer Science, or MATH 1093, Making Connections – Mathematics.\* Students in the Data Analytics track will need to declare an area of domain studies corresponding to which there will be a First Year Making Connections course which will be either 2 or 3 hours. | 2 - 3 |
| **General Education Requirements** | **Sem. Hours** |
| See General Education Curriculum for Baccalaureate Degrees (p. 77)Students with this major must take the following:COMS 1203, Oral CommunicationMATH 1023, College Algebra or MATH course that requires MATH 1023 as a prerequisitePHIL 1103, Introduction to Philosophy | 35 |
| **Major requirements (Program core)** | **Sem. Hours** |
| AGST 3503, Geospatial Data Applications | 3 |
| CS 1114, Concepts of Programming | 4 |
| DATA 2004, Programming for Data Analysis | 4 |
| DATA 3003, Applied Database and Data Mining | 3 |
| DATA 3011, Seminar | 1 |
| DATA 3023, Data Visualization and Data Communication | 3 |
| DATA 303V, Internship | 1 |
| DATA 4003, Fundamental Concepts in Design of Experiments | 3 |
| DATA 4013, Data Science and Data Analytics Capstone  | 3 |
| PHIL 3723, Computers, Ethics, and Society | 3 |
| STAT 3133, Applied Categorical Data Analysis | 3 |
| STAT 3233, Applied Statistics I  | 3 |
| STAT 3243, Regression Analysis and Analysis of Variance (ANOVA) | 3 |
| **Sub-total** | **37** |
|  **Major Requirements (Data Science Track or Data Analytics Track with Domain Studies):** | **Sem. Hours** |
| **Data Science track with Domain Studies** (45-46 hours)CS 4623, Fundamentals of Data ScienceCSED 4231, Principles of Operating SystemsCSED 4241, Principles of Computer OrganizationCSED 4731, Principles of Abstract StructuresMATH 1054, Precalculus MathematicsMATH 2183, Discrete StructuresMATH 2204, Calculus IMATH 2214, Calculus IIMATH 3243, Linear AlgebraDomain Studies of 21 or 22 hours of which 7 hours need to be upper level.**OR****Data Analytics track with Domain Studies** (45-46 hours)AGST 3543, Fundamentals of GIS/GPSCS 1013, Introduction to ComputersMATH 2143, Business Calculus ORMATH 2194, Survey of Calculus ORMATH 2204, Calculus IAGEC 4253, Agriculture and Environmental Data Science ORPOSC 3003, Introduction to Political Analysis ORSTAT 4483, Statistical Methods using R\*\* ORCoordinator approved upper level 3 semester credit hour courseDomain Studies of 32 - 34 hours of which 10 hours need to be upper level.\*\*appropriate for Statistics majors desiring to double major in Data Science and Data Analytics | 45 - 46 |
| **Total Required Hours** | **120** |

**Page 463, before the heading “Digital Design (DIGI)”**

**Before:**

**CS 483V. Internship** Supervised work experience participating in application system development in a business and manufacturing environment. Grade earned will be pass or fail. Prerequisites. Permission of the Computer Science faculty and CS 3113. Irregular.

**Digital Design (DIGI)**

**DIGI 2003. Introduction to Coding with Swift** Foundations in coding using Swift language. Practical application of the tools, techniques, and concepts needed to build a basic iOS app. Fall, Spring.

**After:**

**CS 483V. Internship** Supervised work experience participating in application system development in a business and manufacturing environment. Grade earned will be pass or fail. Prerequisites. Permission of the Computer Science faculty and CS 3113. Irregular.

**Data Science and Data Analytics (DATA)**

**DATA 2004. Programming for Data Analysis**. Programming techniques and tools with application in scientific and data science/data analytics disciplines. Prerequisite, “C” or better in CS 1114 or CS 2114. Fall, Spring.

**DATA 3003. Applied Database and Data Mining.** Current database query methods, technologies and techniques used in data mining, including topics such as classification, association analysis and cluster analysis. Prerequisites, STAT 3233 and “C” or better in CS 1114. Fall.

**DATA 3011. Data Science and Analytics Seminar.** Introduction to data science and analytics as an academic major with a focus on topics such as emergent and current data science research, the relevant tools and skills, and identifying potential career paths across a variety of fields. Restricted to Data Science and Data Analytics majors. Fall.

**DATA 3023. Data Visualization and Data Communication.** Methods and techniques that allow for the visual communication of complex and statistical relationships, including underlying theory and application of current technologies for effective data visualization and data communication for a mass audience. Prerequisite, CS 1114 or CS 2114. Fall.

**DATA 303V. Internship for Data Science and Data Analytics.** Practical experience in Data Science and Data Analytics working in a government organization, private company or in certain instances, within the university. Prerequisites, CS 1114 or CS 2114, AGST 3503, STAT 3233. Fall, Spring, Summer.

**DATA 4003. Fundamental Concepts in Design of Experiments.** Fundamental concepts in planning and conducting experiments and analyzing the resulting data using a major statistical package. Prerequisite, STAT 3243. Fall.

**DATA 4013. Data Science and Data Analytics Capstone.** Application of the knowledge and skills gained in the Data Science and Data Analytics program. Students will create a project to solve a real-world challenge or provide insights into a scientific research area coordinated with academic, industry, or government partners. Prerequisites, Senior standing and consent of instructor. Fall, Spring.

**Digital Design (DIGI)**

**DIGI 2003. Introduction to Coding with Swift** Foundations in coding using Swift language. Practical application of the tools, techniques, and concepts needed to build a basic iOS app. Fall, Spring.