

2020-21

WPI Undergraduate Catalog Supplement

This catalog supplement lists all permanent changes to the curriculum made since the publication of the **2020-21 Undergraduate Catalog** on January 23, 2020.

Items Approved from January 23, 2020 through May 7, 2020

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New Majors, Minors and Concentrations

Business, Robert A. Foisie School of

Business - New minor: Minor in Financial Technology (FinTech)

The Financial Technology (FinTech) minor is designed for students interested in doing an MQP with the Wall St. project center and/or pursuing a career in the financial technology industry, but are not seeking a B.S. in Business with a concentration in FinTech. The financial technology industry and the Wall St. project center are seeking students with technical degrees, e.g., in CS, ECE, IE, MA, but those students also should have some financial and business background. This minor provides that background. It is open to all students, except those seeking a B.S. in Business with a concentration in FinTech.

Recommended background: Ideally, students enrolling in this minor have some knowledge of programming (equivalent to 2/3 units from CS 1004, CS 1101/1102, CS 2102/2103, CS 2119), statistics and/or probability (equivalent to 2/3 units from MA 2611, MA 2612, MA 2621), and differential and integral calculus (equivalent to 2/3 units from MA 1020/1021, MA 1022). Most WPI students will have such background as part of their distribution requirements in technical majors.

Successful candidates for the FinTech Minor must meet the following requirements:

1. Three courses (3/3 units) in accounting and finance as follows:
 - BUS 2060 Financial Statements for Decision Making
 - BUS 2070 Risk Analysis for Decision Making
 - FIN 3300 Finance, Risk Analysis, and Technology
2. One course (1/3 unit) in database technology, selected from:
 - CS 3431 Database Systems I
 - MIS 3270 Business Data Management
3. One FinTech related elective (1/3 unit), selected from:
 - Business courses: BUS 1010, BUS 2080, OIE 2081, OIE 4420, MIS 3787, MIS 4084, MIS 4741
 - Advanced Computer Science courses, 2000-level or above (excluding CS 3043)
 - Data Science courses: any course with the DS prefix
 - Economics courses: ECON 1110, ECON 2110, ECON 2130
 - Advanced mathematics courses: 2000-level or above; Actuarial Mathematics courses (MA 2211, MA 2212, MA 3212, MA 3213) and MA 3231, MA 4235 and MA 4237 are especially relevant. The following courses are excluded (MA 2251, MA 2610, MA 3823, MA 3825, MA 3831, MA 3832, MA 4291, MA 4603, MA 4891).
4. One integrating capstone course (1/3 unit) selected from:
 - CS 3733 Software Engineering
 - MIS 4720 Systems Analysis and Design

Fire Protection Engineering

Fire Protection Engineering - New minor: Minor in Fire Protection Engineering

The FPE department is offering a minor for students who want to expand their engineering background by being exposed to Fire Protection Engineering at undergraduate level. The minor in Fire Protection Engineering provides an excellent

opportunity to acquire a basic knowledge in Fire Protection and articulate this knowledge with their own major in an omnipresent and growing field of engineering that offers exciting careers.

Successful candidates for the FPE Minor must meet the following requirements:

1. Complete two units of work, including at least 1 unit with the prefix “FP” at the 3000-level or above.
2. The remaining courses can be chosen from the following list:
 - i. CHE 2013 – Applied Chemical Engineering Thermodynamics
 - ii. ES 3001 – Introduction to Thermodynamics
 - iii. ES 3003 – Heat Transfer
 - iv. ES 3004 – Fluid Mechanics
 - v. CE 3006 – Design of Steel Structures
 - vi. CE 3008 – Design of Reinforced Concrete Structures
 - vii. CE 3031 – Building Information Modeling: Software Tools and Principles
 - viii. CE 3010 – Structural Engineering
 - ix. AE 3602 – Incompressible Fluids
 - x. ME 442X – Radiation Heat Transfer Application and Design
 - xi. CHE 4410 – Chemical Process Safety Design

Interactive Media & Game Development

[Interactive Media & Game Development - New concentration: Audio & Music Concentration](#)

Students taking the Audio & Music Concentration must:

1. Satisfy the 2/3 units IMGD Focus Pair requirement by choosing Game Audio II and Advanced Topics in Interactive Audio (IMGD 3030 and 4030).
2. Satisfy the 4/3 units IMGD Electives requirement by choosing 1/3 unit from any of:
 - Foundations of Music Technology (MU 2300)
 - Music and Mind (MU 2501)
 - Fundamentals of Music II (MU 2611)
 - Men’s Glee Club (MU 2631)
 - Alden Voices (MU 2632)
 - Brass Ensemble (MU 2633)
 - Jazz Ensemble (MU 2634)
 - Stage Band (MU 2635)
 - Concert Band (MU 2636)
 - String Ensemble (MU 2637)
 - Vocal Performance Lab (MU 2638)
 - Music Composition (MU 2723)
 - Jazz Theory (MU 2730)
 - Making Music with Machines (MU 2801)
 - Other 2000+ level theory or practice courses subject to program approval

- 1/3 unit from any of:
 - Jazz History (MU 2719)
 - Music History I (MU 2720)
 - Music History II (MU 2721)
 - History of American Popular Music (MU 2722)
 - World Music (MU 3001)
 - Other 2000+ level music history courses subject to program approval
 - 2/3 units from any of:
 - Arranging and Orchestration (MU 3002)
 - Topics in MIDI (MU 3614)
 - Topics in Digital Sound (MU 3615)
 - Topics in Interactive Programming (MU 3616)
 - Electronic Music Composition (MU 3620)
 - Other 3000+ level production courses subject to program approval
3. Contribute substantially to the audio and music aspects of their Major Qualifying Project, as determined by the project advisor(s).

Social Science and Policy Studies

Psychological Science - New concentration: Concentration in Diversity Science

Concentration in Diversity Science

Concentration Guidelines:

1. Psychological Science Majors who are interested in psychological study of diversity can choose to complete a concentration in Diversity Science. To complete the concentration, students must complete 2 units of coursework from the approved list of courses related to diversity, equity, and inclusion.
2. All students completing this concentration will need to complete an MQP that relates to Diversity Science.
3. 5/3 units should come from Psychological Science and may include (see Note 1):

PSY 1404: Developmental Psychology

PSY 1412: Mental Health

PSY 2401: Psychology of Education

PSY 2406: Cross-Cultural Psychology: Human Behavior in Global Perspective

PSY 2407: Psychology of Gender

PSY 2408: Health Psychology

PSY 2410: School Psychology

PSY 2504: Human Sexuality

PSY 3000: Psychology and Law

PSY 2999, 3999, or 4999: Research in Psych Science

PSY 1800, 2800, 3800, 4800: Diversity Science Related Topics

a. Note 1: Only one course in this subset can be at the 1000-level

4. 1/3 unit can come from a related course in another discipline that is related to the students area of interest or it may be an additional Diversity Science Psych Science course. Related courses need approval by the Diversity Science Advisor and may include courses such as:

AB 2542: The Culture of Arabic-Speaking Countries
DEV 1200: International Development and Society
EN 1257: Introduction to African American Literature and Culture
EN 2251: Moral Issues in the Modern Novel
ENV: 1100: Introduction to Environmental Studies
ENV 2700: Social Media, Social Movement, and the Environment
GN 3513: Survey of German Civilization and Culture from 1871 to the Present
HI 1311: Introduction to American Urban History
HI 1312: Introduction to American Social History
HI 1322: Introduction to European Cultural History
HI 2341: Contemporary World Issues in Historical Perspective
HU 2340: Popular Culture and Social Change in Asia
HU 2441: African History and Culture
ID 3525: Spanish American Film/Media – Cultural Issues
MU 3001: World Music
PY 2712: Social and Political Philosophy
PY 2716: Philosophy of Difference
PY 3712: Philosophy of Religion
RE 2721: Religion and Culture
RE 2723: Religions of the West
RE 2724: Religions of the East
SOC 1202: Introduction to Sociology and Cultural Diversity
SP 3523: Topics in Latin American Culture
SP 3528: Spanish Culture and Civilization
WR 3300: Cross-Cultural Communication

Updated Majors, Minors and Concentrations

Civil and Environmental Engineering

Civil and Environmental Engineering – Updated B.S. in Civil Engineering

REQUIREMENTS	MINIMUM UNITS
1. Mathematics and Basic Science (Note 1).	4
2. Engineering Science and Design (including the MQP) (Note 2).	6

NOTES:

1. Mathematics and Basic Science
 - a. Must include differential and integral calculus, differential equations, probability, and statistics.
 - b. Must include at least 1/3 unit in physics, 2/3 unit in chemistry, and 1/3 unit in an additional science area.
2. Engineering Science and Design
 - a. 6/3 units Fundamental Engineering Science
 - i. Must include 2/3 units in solid mechanics, 1/3 unit in soil mechanics, and 1/3 unit in fluid mechanics (fulfilled by CE 2000 (or ES 2501), CE 2001 (or ES 2502), CE 3041, ES 3004).

- ii. Must include 2/3 units of engineering science from the following list: CE 2002, ES 2001, ES 2503, ES 2800, ES 3001, ES 3002.
- b. 12/3 units Civil Engineering
 - i. Must include 4/3 units in Core Civil Engineering, including Structural Engineering, Transportation Engineering, Project Management, and Environmental Engineering (fulfilled by CE 3010, CE 3020, CE 3050, CE 3059).
 - ii. Must include 3/3 units of civil engineering depth courses at the 3000-level or above, fulfilled by all CE courses not listed in other notes and with at least 2/3 unit from within one sub-discipline of CE.
 - iii. Must include 2/3 units of civil engineering laboratory experience fulfilled by: CE 2020, CE 3026, CE 4054, CE 4060.
 - iv. Must include 1 unit of MQP, including 1/3 unit of capstone design.

CIVIL ENGINEERING PROGRAM CHART
Course Recommendations

STUDENTS EARNING AN ABET-ACCREDITED B.S. DEGREE IN CIVIL ENGINEERING MUST COMPLETE 15 UNITS OF STUDY, DISTRIBUTED AS FOLLOWS:

UNIVERSITY REQUIREMENTS (4 units)			
Humanities and Arts	Interactive Qualifying Project	Social Sciences	Physical Education
2 units	1 unit	2/3 unit	1/3 unit
See WPI Requirements			

FREE ELECTIVES (1 unit)
Free Electives
1 unit
Students are encouraged to consider additional CE courses (e.g., CE 1030, CE 3030, CE breadth) or other engineering courses.

MATHEMATICS AND BASIC SCIENCE (4 units)							
Differential & Integral Calculus	Differential Equations	Statistics	Probability	Chemistry	Physics	Additional Science	Math/ Science Elective
4/3 unit	1/3 unit	1/3 unit	1/3 unit	2/3 unit	1/3 unit	1/3 unit	1/3 unit
MA 1020/1021 MA 1120/1022 MA 1023 MA 1024	MA 2051	MA 2611	MA 2621	CH 1010 CH 1020	PH 1110/1111	GE or BB	MA, CH, PH, GE, or BB

ENGINEERING SCIENCE AND DESIGN (6 units)

Fundamental Engineering Science	Core CE	Labs	MQP
4/3 unit	4/3 unit	2/3 unit	1 unit
CE 2000 (or ES 2501) CE 2001 (or ES 2502) CE 3041 ES 3004	CE 2002 ES 2001 ES 2503 ES 2800 ES 3001 ES 3002	CE 3010 CE 3020 CE 3050 CE 3059	CE 2020 CE 3026 CE 4054 CE 4060
Including 1/3 unit capstone design			

CE Depth			
3/3 unit (at least 2/3 unit from one sub-discipline)			
<u>Structural and Geotechnical Engineering</u>	<u>Environmental Engineering and Water Resources</u>	<u>Transportation Engineering and Development</u>	<u>Construction Engineering and Project Management</u>
CE 3006 CE 3008 CE 3031 CE 3044 CE 4007 CE 4017	CE 3060 CE 3061 CE 3062 CE 3074 CE 4061 CE/CHE 4063 CE 4600	CE 3031 CE 3051 CE 3070 CE 3074 CE 4061 CE 4071	CE 3022 CE 3025 CE 3031 CE 3044

Note: The courses in the above chart can be replaced by other equivalent courses, with the approval of the CE program.

Interdisciplinary Minors

Interdisciplinary Minors – Updated Minor in Sustainability Engineering

This academic minor is intended for students who are interested in gaining knowledge and experience in the principles and practices of engineering design for sustainability, and of the critical role of engineering decisions on the sustainability of the resulting designs. Every engineering discipline impacts the environmental and social sustainability of the planet, and knowledge of the principles of sustainability in engineering design will contribute substantially to professional practice.

While this minor is intended primarily for engineering students, it is open to all students. For non-engineering students the expected background courses may increase the total minor program to more than two units.

Requirements: Candidates for the Sustainability Engineering Minor must meet the following requirements:

1. Complete and obtain approval for the *Application for the Minor in Sustainability Engineering* available from the Registrar or the Office of Sustainability.
 - I. Define a focus for the minor. Some examples are given below but these are not comprehensive. Note that the focus must be distinct from the content of your major and must be supported by the courses in the minor.
 - II. List the academic activities that will be included in the minor, following the general rules for minors at WPI as well as the rules below.
2. Complete two units of work for the minor, one unit of which may be double counted with other degree requirements. The two units must meet the following requirements:
 - I. Must include ES 2800, Environmental Impacts of Engineering Decisions.
 - II. May include at most 1/3 U of relevant 1000-level work from the following list (List A):
 - ENV 1100, Introduction to Environmental Studies
 - Relevant GPS FY 1100 credit.
 - III. Must include 2/3 U of relevant Humanities, Business, and/or SSPS work selected from the following list (List B):
 - DEV 2200, Case Studies in International Development Policy and Engineering
 - DEV 4400, Science, Engineering and Design in International Development
 - ECON 2117, Environmental Economics
 - ECON 2125, Development Economics
 - ENV 2201, Planning for Sustainable Communities
 - ENV 2310, Environmental Governance and Innovation
 - ENV 2400, Environmental Problems and Human Behavior
 - ENV 2600, Environmental Problems in the Developing World
 - ENV 2700, Social Media, Social Movements, and the Environment
 - ENV 3100, Adventures in Sustainable Urbanism
 - ENV 4400, Senior Seminar in Environmental Studies
 - ETR 2900, Social Entrepreneurship
 - GOV 2311, Environmental Policy and Law
 - GOV 2312, International Environmental Policy
 - GOV 2319, Global Environmental Politics
 - STS 1200 Fundamentals of Global Health

- STS 4000 Senior Seminar in Global Health
- HI 2400, Topics in Environmental History
- HI 3317, Topics in Environmental History
- OBC 4367 Leadership, Ethics, and Social Responsibility
- PY 2717, Philosophy and the Environment

IV. Must include at least 2/3 U of engineering work from the following list (List C):

- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- AREN 3020, Architectural Design Studio IV - Building Energy Simulation
- CHE 3702, Energy Challenges of the 21st Century
- CHE 3722, Bioenergy
- CHE/CE 4063, Transport and Transformations in the Environment
- CE 3059, Environmental Engineering
- CE3060, Water Treatment
- CE3061, Sustainable Wastewater Engineering, Treatment and Reuse
- CE 3062, Hydraulics
- CE 3070, Urban and Environmental Planning
- CE 3074, Environmental Analysis
- CE 4600, Hazardous and Industrial Waste Management
- CE 4061, Hydrology
- ECE 3500, Introduction to Contemporary Electric Power Systems
- ES 3001, Introduction to Thermodynamics*
- ES3002, Introduction to Mass Transfer*
- ES 3003, Heat Transfer*
- ES 3004, Fluid Mechanics*
- ME 2820, Materials Processing
- ME 4422, Design and Optimization of Thermal Systems
- ME 4429, Thermofluid Application and Design
- ME 5105, Renewable Energy

note – the course selections from Item IV cannot include more than one ES course.

3. To accommodate new sustainability-related courses and independent study and project activities, up to two-thirds units of equivalent course-work may be substituted for the activities listed under Items I through IV with the approval of the Sustainability Engineering Minor program review committee. This committee may be contacted through the Registrar or the Director of Sustainability.
4. See the WPI Undergraduate Catalog for additional rules for all minors, in particular that the MQP cannot be used in satisfying any Minor and that at most one unit may be double counted with another degree requirement.

Guidance for Students

Possible Focus Areas (not exhaustive):

The following focus areas and sample programs may be helpful in selecting the activities that compose the two units of credit for the minor, but they are not meant to be restrictive in any way.

- Sustainable Engineering in the Developing World
- Engineering Design for Sustainability

- Sustainable Manufacturing
- Clean and Renewable Energy
- Sustainable Engineering Materials
- Resource Recovery and Reuse
- Green Buildings

Example Programs

Clean and Renewable Energy

- FY 1100, Power the World
- ES 2800, Environmental Impacts of Engineering Decisions
- CHE 3702, Energy Challenges of the 21st Century
- AREN 3025, Building Energy Simulation
- ENV 2201, Planning for Sustainable Communities
- ENV 2600 Environmental Problems in the Developing World

Engineering Design for Sustainability

- FY 1100, Recover, Reuse, and Recycle: Building a Lasting World
- ES 2800, Environmental Impacts of Engineering Decisions
- CE 3059, Environmental Engineering
- AREN 3025, Building Energy Simulation
- ENV 2600, Environmental Problems in the Developing World
- CE 3070, Urban and Environmental Planning

Sustainable Engineering in the Developing World

- ES 2800, Environmental Impacts of Engineering Decisions
- ENV 2600, Environmental Problems in the Developing World
- ETR 2900, Social Entrepreneurship
- CE 3070, Urban and Environmental Planning
- ECE 3500, Introduction to Contemporary Electric Power Systems
- GOV 2319, Global Environmental Politics

Green Buildings (Focus not available to Architectural Engineering students)

- ES 2800, Environmental Impacts of Engineering Decisions
- GOV 2311, Environmental Policy and Law
- ETR 2900, Social Entrepreneurship
- AREN 3003, Principles of HVAC Design for Buildings
- AREN 3024, Building Physics
- CE 3070, Urban and Environmental Planning

[New/Updated Course Descriptions](#)

AS 1001. HERITAGE AND VALUES I (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

The AS 1000 sequence of courses are survey courses designed to introduce students to the U.S. Air Force and Air Force Reserve Officer Training Corps. Featured topics include mission and organization of the Air Force, officership and professionalism, military customs and courtesies, and Air Force officer career opportunities. Leadership Laboratory is mandatory for Air Force ROTC cadets and complements this course by providing cadets with followership experiences. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 1002. HERITAGE AND VALUES II (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS1001. Topics include Air Force core values, leadership principles, group leadership dynamics, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 1003. HERITAGE AND VALUES III (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS1002. Topics include Air Force core values, leadership principles, group leadership dynamics, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 1004. HERITAGE AND VALUES IV (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS1003. Topics include Air Force core values, leadership principles, group leadership dynamics, and an introduction to communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 2001. TEAM AND LEADERSHIP FUNDAMENTALS I (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

The AS 2000 sequence of courses are designed to provide a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare cadets for field training and leadership positions in the detachment. In addition, the students will continue to discuss the importance of the Air Force core values through the use of operational examples and historical Air Force leaders, and will continue to develop their communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 2002. TEAM AND LEADERSHIP FUNDAMENTALS II (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS2001. Topics include full-range leadership, problem solving, motivation, and continued development of communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 2003. TEAM AND LEADERSHIP FUNDAMENTALS III (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS2002. Topics include team building, Human Relations, conflict management, and continued development of communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 2004. TEAM AND LEADERSHIP FUNDAMENTALS IV (GENERAL MILITARY COURSE).

Cat. I (1/9 unit)

Continuation of AS2003. Topics include ethical decision making, stress management, leadership capstone, and continued development of communication skills. Leadership Laboratory is mandatory for AFROTC cadets and complements this course by providing cadets with followership experiences.

AS 3001. LEADING PEOPLE AND EFFECTIVE COMMUNICATION I (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

The AS 3000 sequence of courses is a study utilizes cadet's field training experience to take a more in-depth look at leadership. Special emphasis is placed on enhancing communication skills, and why that is important as a leader. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 3002. LEADING PEOPLE AND EFFECTIVE COMMUNICATION II (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS3001. Topics include, Bias, Managing Diversity & Inclusion, Cross-Cultural Competence, Managing Competing Priorities, and continued development of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 3003. LEADING PEOPLE AND EFFECTIVE COMMUNICATION III (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS3002. Topics include, Leadership theory, mentoring, Professionalism is a Decision, Ethical Decision-Making: Boundaries, Self-Awareness, and continued development of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 3004. LEADING PEOPLE AND EFFECTIVE COMMUNICATION IV (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS3003. Topics include, Creating a Vision, Organizational Climate, Establishing Expectations, Theory and innovation, and continued development of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 4001. NATIONAL SECURITY/COMMISSIONING PREPARATION I (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

The AS 4000 sequence of courses is designed for college seniors and gives them the foundation to understand their role as military officers and how they are directly tied to our National Security Strategy. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 4002. NATIONAL SECURITY/COMMISSIONING PREPARATION II (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS4001. Topics include, Air Force Domains, The Total Force, Defense Support of Civil Authority, Law of War, How the Air Force Deploys, Global Hot Spots, and continued emphasis is given to the refinement of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 4003. NATIONAL SECURITY/COMMISSIONING PREPARATION III (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS4002. Topics include, Base Agencies, Professional/Unprofessional Relationships, Leadership Authority and Responsibility, Religious Accommodation, Suicide Prevention, Military Justice, and continued emphasis is given to the refinement of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

AS 4004. NATIONAL SECURITY/COMMISSIONING PREPARATION IV (PROFESSIONAL OFFICER COURSE).

Cat. I (1/6 unit)

Continuation of AS4003. Topics include, Corrective Supervision and Counseling, Blended Retirement System, Enlisted and Officer Evaluation systems, Pay, Allowances and leave, Career Progression, the Oath of Office, and continued emphasis is given to the refinement of communication and leadership skills. A mandatory Leadership Laboratory complements this course by providing advanced leadership experience in officer-type activities, giving students the opportunity to apply the leadership and management principles of this course.

Civil and Environmental Engineering

CE 3061. SUSTAINABLE WASTEWATER ENGINEERING: TREATMENT AND REUSE.

Cat. I

This course provides an in-depth study of the theory and practice of sustainable wastewater management practices, including treatment operations and reuse opportunities. The course will incorporate resource recovery concepts involving water, nutrients, and energy. Topics include: sources of wastewater, wastewater characteristics, emerging contaminants, biosolids operations, wastewater reuse approaches, and physical, chemical, and biological processes for wastewater treatment and reuse.

Recommended background: CE 3059 and ES 3004.

Fire Protection Engineering

FP 3070. INTRODUCTION TO FIRE PROTECTION ENGINEERING.

Cat. I

This course teaches students of different technical disciplines the fundamentals of fire protection engineering including combustion chemistry, fire behavior, compartment fire dynamics, toxicity, human behavior in fire, and fire modelling. Students have an opportunity to conduct and view fire experiments in both the WPI Fire Safety Engineering and the WPI Fire Fundamentals laboratories. Fire models are used to aid in use of the scientific method to determine cause and origin of a fire. This course is intended for both majors and non-majors as an introduction into Fire Protection Engineering (FPE) and how engineering knowledge can be used to save lives and property around the world.

FP 4000. FIRE LABORATORY.

Cat. I

This course will cover experimental methods used in fire research as well as other thermal-fluid topic areas. Students will learn fundamentals of metrology (calibration, sensor response constraints, uncertainty quantification), standard tests in fire research (i.e. cone calorimeter, fire propagation apparatus, etc.), as well as other measurement methods (thermocouples, heat flux gauges, velocimetry, thermometry, etc.). Students will also learn design of experiments and conduct a large-scale experiment in the UL performance lab.

Recommended background: MA 2051 Differential Equations and ES 3001 Thermodynamics.

FP 4001. FIRE, RISK, AND SUSTAINABILITY.

Cat. I

As the pace of development increases around the world, fire prevention and control are becoming more vital for individuals, organizations, and society itself. This course introduces students to the fundamental concepts of fire risk and

sustainability along with related multi-disciplinary topics such as economics, human behavior, and decision-making. The process of fire risk assessment is taught and applied to the built environment and to the wildland fire problem. Students will undertake a structured applied-research project (individually or in small groups) to develop sustainable solutions at the interface of fire and a chosen area of sustainability such as climate change, safe drinking water, public health, housing, and more.

Recommended background: Basic knowledge of fire behavior and control (FP 3070 or equivalent).

Students cannot receive credit for both FP 4001 and FP 580S – Fire, Risk and Sustainability.

Humanities and Arts

AR/IMGD 3210. HUMAN FIGURE IN MOTION.

Cat. II

This course offers in-depth analysis of the human figure in action. Motion is analyzed and studied through drawing and sketching of live models, video clips, performance and pantomime, studying not only the physical exterior but also how thoughts and emotion are expressed through gesture. Students will develop skill in figure posing and staging for applications in animation, storyboards, comics, and illustration.

Recommended background: Observational and gesture drawing and color (AR 1101), experience drawing live model (AR 2202), composition skills and color (AR/IMGD 2700).

HU 2910. PROJECT CENTER EXPERIENTIAL LEARNING.

Cat. III

This course will provide students participating in a HUA Project Center with a framework for investigating a particular cultural site, and to define a unique set of humanities and arts learning goals through experiential learning. Experiential learning means learning from experience or learning by doing. Experiential education immerses learners in an experience and then encourages reflection about the experience to develop new skills, new attitudes, or new ways of thinking. This course is structured in a self-directed manner in which students select a humanities/arts topic or theme, explore and experience arts and cultural sites related to that theme, then engage in self-reflection and self-evaluation of their learning.

Interactive Media & Game Development

IMGD/AR 3210. HUMAN FIGURE IN MOTION.

Cat. II

This course offers in-depth analysis of the human figure in action. Motion is analyzed and studied through drawing and sketching of live models, video clips, performance and pantomime, studying not only the physical exterior but also how thoughts and emotion are expressed through gesture. Students will develop skill in figure posing and staging for applications in animation, storyboards, comics, and illustration.

Recommended background: Observational and gesture drawing and color (AR 1101), experience drawing live model (AR 2202), composition skills and color (AR/IMGD 2700).

IMGD 4030. ADVANCED TOPICS IN INTERACTIVE AUDIO.

Cat. II

This course provides students the opportunity to gain hands-on proficiency with the complete audio development pipeline for interactive applications, from concept and asset creation to post-production and integration. Topics may include custom recording techniques; procedural audio generation; audio object states and conditions; asset management; automated effects processing; and spatial presentation of audio in stereo, surround and mixed/virtual reality formats.

Recommended background: Prior experience with editing and mixing techniques on a digital audio workstation (such as provided by IMGD 2030), together with experience in studio and field recording of audio and voices (such as provided by IMGD 3030).

Social Science and Policy Studies

GOV 2318. COMPARATIVE HEALTHCARE: POLICY, POLITICS, AND ADVOCACY.

Cat. II

The topic of healthcare and health insurance is featured in the media daily and is on the policy table at the local, state, national, and global levels. Many students encounter healthcare issues in their course work or IQPs. In this course, students will gain an introduction to healthcare policy in the United States, which will be compared with health policies across the globe. Utilizing a healthcare disparities and social justice framework, the course explores mental and physical health care policy, history, the present and the future of U.S. health care policy, and how to advocate for policies that address healthcare disparities. The impact of health policy upon individuals, groups, families, and communities is addressed as well. The role of the various levels of government in the provision of healthcare services is covered, as is the role that technology can play in the advancement of healthcare.

Students shall not receive credit for both GOV 234X and GOV 2318.

Recommended background: Basic background in public policy, such as GOV 1303

PSY 3400. SURVEY DESIGN AND METHODOLOGY.

Cat. II

Surveys are everywhere. But good surveys based on sound social science are rare. Conducting a successful survey requires familiarity with the methods and techniques developed by psychologists and other social scientists through long experience to ensure the accuracy, reliability, and validity of survey data. This course will focus on the common mistakes of first time survey researchers and ways to avoid them. Topics covered will include alternatives to survey research, sampling, response rates, questionnaire design and implementation, question wording, pretesting, ethical issues in survey research, and communicating survey results. Special attention will be given to issues related to the use of on-line survey platforms. During the course students will be guided through the development, implementation, and analysis of a survey on a topic of their own choosing.

This course is an appropriate methodology course for psychology and other social science majors and can also be taken by students of all majors as preparation for a survey-based IQP or MQP.

Recommended background: Introduction to Psychological Science (PSY1400), Social Psychology (PSY1402), or Cognitive Psychology (PSY1401).

Students who completed PSY 340X cannot receive credit for PSY 3400.

Dropped Courses

Civil and Environmental Engineering

3024. CONTROL SURVEYING.

Cat. II

This course presents the principles and field procedures required in the design of vertical and horizontal control networks for large building and construction projects.

Recommended background: CE 2020. This course will be offered in 2018-19, and in alternating years thereafter