ARIZONA BOARD OF REGENTS
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# Request to Establish New Academic Program in Arizona

**University: University of Arizona**

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| **Name of Proposed Academic Program:** Bachelor of Science in Integrated Business and Engineering |
| **Academic Department:**<br>McGuire Center for Entrepreneurship, Eller College of Management *jointly with* Systems and Industrial Engineering Department, the College of Engineering |
| **Geographic Site:**<br>Tucson- Main |
| **Instructional Modality:**<br>In-person, hybrid |
| **Total Credit Hours:**<br>120 |
| **Proposed Inception Term:**<br>Fall 2025 |
| **Brief Program Description:**<br>The BS in Integrated Business and Engineering provides a unique opportunity for students to gain technical engineering skills while increasing their business acumen. These students will be able to excel in the fast-paced and exciting world of technology-focused business opportunities. By applying their business capabilities to engineering issues, these graduates will be able to meet the challenges of leading companies in an ever-increasing technical environment.<br><br>Based on the success of similar programs throughout the country (mostly on the east coast), we believe that this new major, which brings together important engineering understanding and business acumen will not only be of great interest to students, but also to employers. As industry becomes more integrated, it requires multidisciplinary expertise and insights. This program will provide that for employers, especially for those seeking leadership in an engineering environment. We have opted to stand up this major as we will disestablish the legacy Engineering Management undergraduate major. The engineering management undergraduate major was an ABET-accredited engineering degree which included some management outcomes. We feel that this new major which has more focus on management skills while keeping the engineering understanding will more closely align with our students' needs and interests.<br><br>A significant aspect of the program is the students' focus on project design and development. Each semester, every student in the program will learn project design or work on a project which aligns their business background with technical skills. They will learn to work with real clients to understand project requirements, new venture development and employ the skills that they are learning along the way in a real-world se]ng. This active, experiential learning will reinforce the classroom techniques they will be taught throughout the program. |
| **Learning Outcomes and Assessment Plan:** |

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| **Learning Outcome #1:** Identify, formulate, and solve complex entrepreneurial problems by applying principles of business, engineering, science, and mathematics**.** |
| **Concepts:** Basic engineering, accounting, finance, entrepreneurship |
| **Competencies:** Engineering principles, business management, new venture activities |
| **Assessment Methods:** Assignment in FIN 480 and ENTR 465 and customer feedback in IBE 498C/D |
| **Measures:** Instructor grading assignment and customer feedback survey |
| |
| **Learning Outcome #2:** Apply business concepts and engineering design to produce solutions that meet specific needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors. |
| **Concepts:** Developing holistic solutions considering all stakeholders |
| **Competencies:** Business processes, engineering understanding, synthesizing stakeholder and environmental concerns |
| **Assessment Methods:** IBE 2XX customer feedback, assignments in ENTR 465, IBE 498C/D customer feedback |
| **Measures:** Customer survey and instructor grading of assignments |
| |
| **Learning Outcome #3:** Communicate business and engineering processes and solutions effectively with a range of audiences. |
| **Concepts:** Business and engineering processes |
| **Competencies:** Presentation skills |
| **Assessment Methods:** Instructor assessment on assignment in CE301 and IBE 300B, customer feedback in IBE 2XX, IBE 498C/D |
| **Measures:** Grades on presentations in multiple courses. |
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| **Learning Outcome #4:** Recognize ethical and professional responsibilities in business and engineering situations and make informed judgments, which must consider the impact of such solutions in global, economic, environmental, and societal contexts. |
| **Concepts:** Ethical responsibilities, leadership in organizations, global views of issues |
| **Competencies:** Ethical conduct, leadership, consideration of multiple factors in decision making |
| **Assessment Methods:** Ethics quiz, leadership position assessment in team efforts in IBE 2XX, IBE498C/D |
| **Measures:** Ethics in Engineering quiz score, leadership assessment by instructor |
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| **Learning Outcome #5:** Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. |
| **Concepts:** Teamwork, appreciation of others' talents and time, identification and planning of tasks for a team |
| **Competencies:** Patience, understanding, leadership, planning, responsibility towards others |
| **Assessment Methods:** Instructor assessment, team feedback, customer feedback |

**Measures:** Instructor and team assessment for IBE 2XX, IBE 498C/D

| | Learning Outcome - Assessment Map | | | | |
|---|---|---|---|---|---|
| | **Solve Complex Problems** | **Design Solutions** | **Communicate** | **Ethical Responsibilities** | **Function as a Teammate** |
| | An ability to identify, formulate, and solve complex entrepreneurial problems by applying principles of business, engineering, science and mathematics. | An ability to apply business concepts and engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors | An ability to communicate business and engineering processes and solutions effectively with a range of audiences. | An ability to recognize ethical and professional responsibilities in business and engineering situations and make informed judgments, which must consider the impact of such solutions in global, economic, environmental, and societal contexts. | An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. |
| **Courses and Learning Activities** | | | | | |
| MIS 111 Computers and Internetworked Society | R | | | | |
| MIS 112 Computers and Internetworked Society - Lab | | R | | | |
| IBE 102C Introduction to Integrated Business Engineering Lecture | I | | | | |
| ECON 200 Basic Economic Issues | | R | | | |
| SFWE 101 Introduction to Software Engineering | | R | | | |
| IBE 102D Introduction to Integrated Business Engineering | I | | I | | I |
| IBE 2XX Introduction to Engineering Entrepreneurship | R | I | | R | R |
| ACCT 250 Information for Business Decisions | | R | | R | |
| SIE 265 Engineering Management I | R | | | | |
| BNAN 276 Statistical Inference in Management | R | | | | |
| BNAD 302 Human Side of Organizations | | | R | | |
| IBE 2XX IBE Projects in the Community | R | R | | R | R |
| CE 214 Statics | | R | | | |
| AME 230 Thermodynamics | | R | | | |
| BNAD 301 Global and Financial Economics and Strategies | | R | | | |
| ENTR 400 Tech Ventures | R | | R | | R |
| IBE 300A Junior Seminar I | | | | I | |
| CE 301 Technical Communications | R | | R | | |
| ECE 207 Elements of Electrical Engineering | R | R | | | |
| BNAD 303 Marketing Principles, Concepts and Tools | R | | | R | |
| ENTR 465 Global Social Entrepreneurship | | R | | R | |
| SIE 457 Project Management | R | | R | R | |
| IBE 300B Junior Seminar II | | | R | R | |
| IBE 498C Innovation and New Venture Development Capstone I | M | M | M | M | M |
| FIN 480 Finance for New Ventures | R | | | R | |
| MKTG 480 Marketing Research for Entrepreneurs | R | R | | | |
| IBE 498D Innovation and New Venture Development Capstone II | M | M | M | M | M |
| SIE 415 Technical Sales and Marketing | R | R | | | |
| | | **Legend:** | **I - Introduced** | **R - Reinforced** | **M - Mastered** |

| **Assessment Measure** | **Source(s) of Evidence** | **Data Collection Point(s)** |
|---|---|---|
| Job Placement Statistics | Student/Alumni Survey | At graduation, 90 days out |
| Academic Program Review | Board of Advisors input | Annually at the end of the school year |
| Outcome assessment | Outcome measures | End of each semester |

**Projected Enrollment for the First Three Years:**

| | 1st Year | 2nd Year | 3rd Year |
|---|---|---|---|
| Number of Students | 30 | 50 | 75 |

**Evidence of Market Demand:**

The demand for our IBE graduates will be strong in the future. There are many areas in which our graduates can be employed. One of the many potential employment opportunities for our IBE graduates is in the field of Management Science. The potential for employment moving forward in this area nationally and for the state of Arizona are shown below:

| 8.89M | +14.1% | $35.83/hr<br>$74.5K/yr | 949,479 |
|---|---|---|---|
| Jobs (2022)* | % Change (2022-2032)* | Median Earnings | Annual Openings* |

| Occupation | 2022 Jobs* | Annual Openings* | Median Earnings | Growth (2022 - 2032)* |
|---|---|---|---|---|
| General and Operations Managers | 1,181,080 | 117,980 | $48.52/hr | +13.68% |
| Accountants and Auditors | 924,652 | 86,550 | $38.42/hr | +11.49% |
| Customer Service Representatives | 676,648 | 95,865 | $19.06/hr | +1.50% |
| Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products | 556,414 | 56,166 | $31.38/hr | +6.45% |
| Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel | 507,457 | 60,633 | $30.96/hr | +16.14% |
| Business Operations Specialists, All Other | 490,624 | 51,482 | $38.12/hr | +12.14% |
| Market Research Analysts and Marketing Specialists | 483,592 | 61,574 | $35.62/hr | +24.69% |
| Management Analysts | 451,836 | 48,645 | $47.75/hr | +17.88% |
| First-Line Supervisors of Office and Administrative Support Workers | 427,299 | 43,969 | $30.44/hr | +2.82% |
| Human Resources Specialists | 420,781 | 46,334 | $32.53/hr | +18.41% |
| Project Management Specialists | 417,914 | 44,117 | $47.31/hr | +24.90% |
| Managers, All Other | 375,924 | 35,746 | $49.46/hr | +15.72% |
| Financial Managers | 333,610 | 34,053 | $74.52/hr | +25.35% |
| First-Line Supervisors of Retail Sales Workers | 301,968 | 31,363 | $21.80/hr | +1.72% |
| Computer User Support Specialists | 281,738 | 23,302 | $28.47/hr | +9.78% |
| Sales Managers | 265,928 | 25,932 | $64.56/hr | +16.77% |
| Computer and Information Systems Managers | 254,640 | 27,535 | $81.24/hr | +31.82% |
| Marketing Managers | 206,475 | 24,121 | $73.47/hr | +25.30% |
| Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products | 125,015 | 15,154 | $47.75/hr | +18.49% |

Statistics for Growth Nationally in the Field of Management Science

| 34,167 | +14.5% | $41.26/hr<br>$85.8K/yr | 3,377 |
|---|---|---|---|
| Jobs (2022)*<br>23% above National average* | % Change (2022-2032)*<br>Nation: +13.9%* | Median Earnings<br>Nation: $49.55/hr;<br>$103.1K/yr | Annual Openings* |

| Occupation | 2022 Jobs* | Annual Openings* | Median Earnings | Growth (2022 - 2032)* | Employment Concentration (2022)* |
|---|---|---|---|---|---|
| General and Operations Managers | 31,264 | 3,084 | $40.83/hr | +13.55% | 1.28 |
| Chief Executives | 1,955 | 180 | $62.94/hr | +15.40% | 0.80 |
| Operations Research Analysts | 949 | 114 | $36.55/hr | +43.10% | 1.02 |

Statistics for Growth in Arizona in the Field of Management Science

Note that job growth in the field of management science within our region is projected to grow at a faster pace than the nation as a whole. Thus, this new degree program will serve both local, state, and national needs related to employment, economic development, and national security. Indeed, these degree programs are among the most important in support of the ongoing fourth industrial revolution and in close alignment with Arizona's New Economy Initiative.

Source: Lightcast Q2 2024 Data Set obtained May 2024

**Similar Programs Offered at Arizona Public Universities:**
BS in Engineering Science (Business), Arizona State University

**Objection(s) Raised by Another Arizona Public University?** YES NO
Has another Arizona public university lodged a written objection to the proposed program with the proposing university and the Board of Regents within seven days of receiving notice of the proposed program?

**If Yes, Response to Objections:**
Please provide details of how the proposing university has addressed the objection. If the objection remains unresolved, please explain why it is in the best interests of the university system and the state that the Board override it.

**New Resources Required?**
The BS in Engineering Management will be disestablished so those resources (Director, faculty) will be redeployed to support the BS in IBE. Academic advising will be housed in the Eller centralized advising team led by Laura Ullrich, Senior Director, Academic Advising. Additional student support staff will be hired as this program grows.

**Plan to Request Program/College Fee?** YES **NO**

**Estimated Amount: n/a**

**Fee Justification: n/a**

**Specialized Accreditation?** **YES** NO

**Accreditor:**
Association to Advance Collegiate Schools of Business