

MTDE - MULTIDISCIPLINARY ENGR (MTDE)

MTDE 252 Engineering Entrepreneurship Hour

Credit 1. 1 Lecture Hour. Engagement with successful technology entrepreneurs from technical sectors across engineering and the nation; challenges faced by and characteristics of successful entrepreneurs and their strategies in launching and sustaining businesses on technology innovation; network with highly successful entrepreneurs and develop relations valuable to professional careers; development of speaking and presentation skills; networking with industry professionals in support of entrepreneurship. **Prerequisites:** Grade of C or better in ENGR 102; or approval of instructor.

MTDE 285 Directed Studies

Credits 0 to 6. 0 to 6 Other Hours. Directed studies within the field of multidisciplinary engineering. **Prerequisite:** Sophomore classification and approval of multidisciplinary engineering director or delegate.

MTDE 289 Special Topics in...

Credits 1 to 4. 1 to 4 Other Hours. Selected topics in an identified area of multidisciplinary engineering. May be repeated for credit.

MTDE 291 Research

Credits 1 to 6. 1 to 6 Other Hours. Research conducted under the direction of faculty member in multidisciplinary engineering. **Prerequisite:** Sophomore classification and approval of multidisciplinary engineering director or delegate.

MTDE 311 Enterprise Basics for Technical Entrepreneurs

Credits 3. 3 Lecture Hours. Aspects of entrepreneurship for a technical enterprise; elements of a business including idea generation, startup financing, staffing, product design and production, marketing and selling a product; focus on the front end of the venture; product design and development, financing, identifying and attracting key personnel, and starting up company. **Prerequisites:** Grade of C or better in MTDE 252, or approval of instructor.

MTDE 312 Sales, Operations and Manufacturing for Technology Companies

Credits 3. 3 Lecture Hours. Challenges faced in a start-up entity with respect to product manufacturing, operations and supply chain management, product pricing strategies, and sales and marketing; focus on small start-up to young mid-size enterprises. **Prerequisites:** Grade of C or better in MTDE 252, or approval of instructor.

MTDE 313 Engineer to Chief Executive Officer

Credits 3. 3 Lecture Hours. Fundamental skills, experience, and training necessary to one day serve in the Chief Executive Officer (CEO) role; exploration of what it means to be the CEO and to take on those responsibilities along with the personal and professional commitments associated with this important position; study of critical area of communications and effective ways to interface with the key stakeholder groups represented by shareholders, board of directors, executive management team, employees, customers, the media and communities where the company does business. **Prerequisite:** Completion of one summer internship or co-op; or approval of instructor.

MTDE 314 Skills for Technology Leadership

Credits 3. 3 Lecture Hours. Insight into career paths for engineers and technologists; emerging technology learning and evaluation; technology talent evaluation and management; elements of technology strategy; technology management processes and frameworks; communicating complex technologies; technology leader's roles in various organizations. **Prerequisites:** Junior or senior classification.

MTDE 315 Startup Fundamentals - Launching, Growing and Exiting a Startup Company

Credits 3. 3 Lecture Hours. Fundamental skills, experience, and training necessary to launch a startup company; techniques for growing the startup including branding, sales, transitioning from prototypes to production, human resources and organization design, and its operations; exit opportunities, such as understanding financials and company evaluations, developing negotiating skills, and exit options including, a strategic buyout, IPO, liquidation and bankruptcy. **Prerequisites:** Grade of C or better in MTDE 252; or approval of instructor.

MTDE 320 Engineering for Sustainable Development

Credits 3. 3 Lecture Hours. Principles of sustainable development applied to multidisciplinary engineering design; systems thinking approaches with aims towards optimal balances of technology benefits for society, economy, and environment; impacts of engineering innovation within realistic constraints; circular economy with engineering and financial implications. **Prerequisites:** Grade of C or better in ENGR 216/PHYS 216; junior or senior classification, or approval of instructor; also taught at Qatar campus.

MTDE 333 Project Management for Engineers

Credits 3. 3 Lecture Hours. Basic project management for engineering; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers. **Prerequisites:** Junior or senior classification, classification in the College of Engineering or Biological and Agricultural Engineering, or approval of instructor; also taught at Qatar campus.

MTDE 334 Agile Project Management

Credits 3. 3 Lecture Hours. Agile approach of project management within the context of broader engineering disciplines; agile approaches and lifecycles; agile teams and roles; hybrid projects and tailoring tools; enterprise environmental factors; organizational structures; risk assessment; and principles of agile leadership. **Prerequisites:** Grade of C or better in ENGR 216/PHYS 216 or PHYS 216/ENGR 216, or approval of instructor.

MTDE 371 STEM in National Security

Credits 3. 3 Lecture Hours. Collection and processing of information from overseas by the U.S. Intelligence Community (IC) using science, technology, engineering, and mathematics (STEM); analysis of collected information on technical topics such as technology or weapons; overview of how different IC organizations recruit for and use STEM backgrounds; and process of the intelligence cycle from a STEM perspective including technical collection techniques, cyber and counterintelligence issues, and production of technical analysis for policymakers using open source information. **Prerequisites:** Grade of C or better in PHYS 206; or approval of instructor.

MTDE 380 Seminar Series in Engineering Project Management

Credit 1. 1 Lecture Hour. Presentations by practicing engineers and professionals addressing engineering project management process and practice; discussion forum to better understand the opportunities and challenges of engineering project management and the analytical tools and skills required to be successful. **Prerequisites:** Grade of C or better in MTDE 333 or concurrent enrollment; or approval of instructor; junior or senior classification in the College of Engineering or biological and agricultural engineering (BAEN).

MTDE 381 Professional Development Seminar-Subsea Engineering

Credit 1. 1 Lecture Hour. Presentations by subsea engineering industry experts; relation of subsea engineering principles to real world scenarios; application of analytical reasoning through class presentations, discussions, assignments, reports, specific to subsea field development design and operations; proper design and operation of subsea production systems including subsea hardware, umbilicals, risers, flowlines, flow assurance, subsea architectures, multiphase flow and several related areas of subsea production systems. Must be taken on a satisfactory/unsatisfactory basis. **Prerequisite:** Grade of C or better in MTDE 430, or concurrent enrollment; or approval of instructor.

MTDE 409 Patent Law for Engineers

Credits 3. 3 Lecture Hours. Exploration of how proprietary interests in technology are protected by patent law, with a focus on issues of patent validity, patent-eligible subject matter and the enforcement of patent rights.

MTDE 421 Technology Company Management, Leadership, and Corporate Culture

Credits 3. 3 Lecture Hours. Strategic challenges associated with enterprise management and leadership; establishing and maintaining a sustainable brand; developing an effective corporate culture; dealing with global competition; case studies in strategic thinking. **Prerequisites:** Grade of C or better in MTDE 311, MTDE 312, MTDE 313, or MTDE 314, or approval of instructor.

MTDE 430 Fundamentals of Subsea Engineering

Credits 3. 3 Lecture Hours. Orientation to subsea engineering fundamentals, including SURF (Subsea, Umbilicals/Controls, Risers, Flowlines) equipment and configurations; exposure to practical, industry focused problems; subsea equipment components; design considerations and design drivers; subsea production operations; integrity critical maintenance activities. **Prerequisites:** Junior or senior classification; enrolled in the College of Engineering or approval of instructor.

MTDE 432 Subsea Project Implementation

Credits 3. 3 Lecture Hours. Overview of the realization of a subsea development project; includes all stages from discovery to pre-commissioning of the subsea infrastructure. **Prerequisite:** Grade of C or better in MTDE 430 or concurrent enrollment.

MTDE 433 Transition from Fossil Fuels

Credits 3. 3 Lecture Hours. Current status of energy supplies; overview of energy source trends and forecast of what will be seen in the future; examination of renewable energy sources, their technology, what the challenges are and how will these be overcome; key consideration appraises how the transition will be founded on what we are doing now. **Prerequisites:** Junior or senior classification; enrolled in the College of Engineering.

MTDE 440 Subsea Hardware Design

Credits 3. 3 Lecture Hours. Basic elements that make up subsea hardware assemblies; understanding of how these elements work together in a system; decision, design, and project teaming processes for subsea hardware projects. **Prerequisite:** Grade of a C or better MTDE 430; or approval of instructor.

MTDE 441 Subsea Umbilical and Control System Design

Credits 3. 3 Lecture Hours. Practical view of subsea umbilical and controls system project realization from concept selection through installation and offshore acceptance testing. **Prerequisite:** Grade of C or better in MTDE 430, or concurrent enrollment.

MTDE 442 Subsea Pipeline Design

Credits 3. 3 Lecture Hours. Realization of pipeline projects from concept selection through installation and offshore acceptance testing; emphasis on practical applications of theory to project delivery. **Prerequisite:** Grade of C or better in MTDE 430 or approval of instructor.

MTDE 443 Subsea Riser Design

Credits 3. 3 Lecture Hours. Realization of subsea riser projects from concept selection through installation and offshore acceptance testing; emphasis on practical applications of theory. **Prerequisite:** Grade of C or better in MATH 251 or MATH 253, and MATH 308; or approval of instructor.

MTDE 445 The Hydrogen Economy

Credits 3. 3 Lecture Hours. Advances in the hydrogen economy and hydrogen production from renewable sources; hydrogen storage, transport, delivery and utilization of clean energy using decarbonization methods; design and operation of hydrogen production hubs and equipment; integrity of critical maintenance activities; case studies of commercial applications; current technological challenges and innovations; economic and risk analyses and their controls. **Prerequisites:** Junior or senior classification; enrollment in the College of Engineering or approval of instructor.

MTDE 446 Applied Reliability Engineering to Subsea Systems

Credits 3. 3 Lecture Hours. Overview of the application of reliability engineering to subsea systems and all stages from discovery to pre-commissioning of the subsea infrastructure. **Prerequisite:** Grade of C or better in MATH 251 and MATH 308; or approval of instructor.

MTDE 450 Flow Assurance Operability of Subsea Systems

Credits 3. 3 Lecture Hours. Hydrocarbon production and transport from offshore fields to the host facilities, including prevention and remediation of phenomena that hinder fluid flow in production systems; subsea architecture, hydrodynamic and thermal considerations, reservoir fluid characterization and analysis, solids management, thermal hydraulics and production chemistry. **Prerequisite:** Grade of C or better in MTDE 430 or approval of instructor.

MTDE 451 Subsea Production Operations

Credits 3. 3 Lecture Hours. Multiphase hydrocarbon production and transport from offshore fields to host facilities under both steady-state and transient conditions; including reservoir and SURF system management through chemical gas and water injection, surface and subsea processing, testing and maintenance through all phases of a subsea development. **Prerequisite:** Grade of C or better in MTDE 430 or approval of instructor.

MTDE 461 Product Lean Launch for Engineers

Credits 3. 2 Lecture Hours. 2 Lab Hours. Exercises in the creation of an engineering-centric business using lean startup principles; customer and market validation; value proposition creation; minimum viable product (MVP) development; customer value chain discovery; communication skill training; development of a business model canvas for a student-developed engineering product business idea. **Prerequisites:** Grade of C or better in MTDE 311, MTDE 312, MTDE 313, or MTDE 314; or approval of instructor.

MTDE 485 Directed Studies

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MTDE 489 Special Topics In...

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