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| <b>Course Title</b>      | Manufacturing Innovation Management  |                 |                     |                     |
| <b>Course Code</b>       | MED508   |                 |                     |                     |
| <b>Course Type</b>       | Elective   |                 |                     |                     |
| <b>Level</b>             | Masters (2 <sup>nd</sup> Level)  |                 |                     |                     |
| <b>Year / Semester</b>   | 1 <sup>st</sup> year / Spring Semester   |                 |                     |                     |
| <b>Teacher's Name</b>    | Dr. Michalis Menicou   |                 |                     |                     |
| <b>ECTS</b>              | 10   | Lectures / week | 3                   | Laboratories/week - |
| <b>Course Purpose</b>    | <p>Humanity stands on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. The main characteristic of this era is that innovation cycles will become shorter. Within this context, the purpose of this course is to help students develop the skills and competences to work in this emerging environment. In particular, it will deal with various facets of manufacturing businesses management, design, research and development, production, supply chain and logistics management, highly intelligent, information-driven factories business models, new customised smart products and services. Last but not least, it will deal with business plan development and techniques used to assess new product ideas.</p>                                |                 |                     |                     |
| <b>Learning Outcomes</b> | <p>By the end of the course, students must be able to:</p> <ol style="list-style-type: none"> <li>1. Analyse how innovation is managed within companies,</li> <li>2. Combine the main modes of manufacturing and how adoption of a new product governs the selection of appropriate manufacturing process.</li> <li>3. Addressed the main issues to be when designing new manufacturing operations.</li> <li>4. Develop appropriate techniques to manage manufacturing operations.</li> <li>5. Develop comprehensive business plans for new products, addressing all facets of a new product idea.</li> <li>6. Formulate the issue of intellectual property management, technology transfer &amp; strategic alliances.</li> <li>7. Propose various research programs in order to solve product development issues.</li> <li>8. Improve proven techniques, e.g. SWOT/ PESTEL analyses to assess the robustness of new product ideas.</li> </ol> |                 |                     |                     |
| <b>Prerequisites</b>     | None   |                 | <b>Corequisites</b> | None                |
| <b>Course Content</b>    | 1. Innovation Management   |                 |                     |                     |

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|                                    | <p>Innovation management introduction, Managing innovation within companies, operations &amp; process innovation, Managing intellectual property, managing organisational knowledge, strategic alliances &amp; networks, management of research &amp; development, technology transfer, Managing the new product development process.</p> <ol style="list-style-type: none"> <li>2. Market Research<br/>Importance of Marketing intelligence, Marketing Research in practice, Marketing Research process, questionnaire design &amp; administration, Data &amp; information collection, Data Analysis &amp; Results presentation, Market research and its influence on new product development.</li> <li>3. Manufacturing Operations Management<br/>The product/ process matrix, Design operations: Design of Goods &amp; Services, Quality Management, Process selection/ Layout strategies. Linear Programming Tools and their application in operations management, Decision Making tools.</li> <li>4. Supply Chain Management<br/>Managing operations: supply chain management, Inventory management, Materials Requirement Planning, Lean Operations, Maintenance &amp; Reliability.</li> <li>5. Business Plan Development<br/>Development of a business Plan: Description of the product, business model description, Resources: process/ equipment/ personnel/ infrastructure/ expertise required, Market demand, competition, Financials &amp; Forecasts, Risks/ Opportunities/ Sensitivity. SWOT analysis/ PESTEL analysis.</li> <li>6. Product Life – Cycle Assessment (LCA) &amp; Analysis<br/>LCA history &amp; characteristics, applications, contribution to sustainability, examples of LCA impact assessment.</li> </ol> |
| <p><b>Teaching Methodology</b></p> | <p>Teaching methods are based on problem-based learning, cases-based learning and the use of eLearning platform and online sources. All these approaches are related to a more active student-centred education. Lecture notes and presentations are available through the e-learning platform to students for use in combination with textbooks. Furthermore, theoretical principles are explained by means of specific examples/ case studies.</p>   |
| <p><b>Bibliography</b></p>         | <p><b>Textbook</b></p> <ol style="list-style-type: none"> <li>1. Heizer Jay, Render Barry, Munson Chuck, Operations Management: Sustainability and Supply Chain Management, Prentice Hall, 2023.</li> <li>2. Trott Paul, Innovation Management and New Product Development, Prentice Hall, 2021.</li> <li>3. Evans Vaughan, The FT Essential Guide to Writing a Business Plan: How to win backing to start up or grow your business, Prentice Hall, 2016</li> </ol> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Kalpakjian Serope, Schmi Steven, Manufacturing Engineering and Technology, Prentice Hall, 2020</li> </ol>   |

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|-------------------|--|----------------|-----|---------------|-----|
|                   | <ol style="list-style-type: none"> <li>2. Thomas N. Duening, Robert A. Hisrich, Michael A. Lechter, Technology Entrepreneurship: Taking Innovation to the Marketplace, Academic Press, 2020</li> <li>3. Adedeji B. Badiru, Global Supply Chain: Using Systems Engineering Strategies to Respond to Disruptions, CRC Press, 2022</li> <li>4. Kiyoshi Suzakil, New Manufacturing Challenge: Techniques for Continuous Improvement, Free Press, 2012</li> <li>5. Leonid Burstein, Handbook of Research on Advancements in Manufacturing, Materials, and Mechanical Engineering, Engineering Science Reference, 2020</li> <li>6. José Machado, Filomena Soares, Justyna Trojanowska, Erika Ottaviano, Innovations in Mechanical Engineering, Springer, 2021</li> <li>7. William B. Bonvillian, Peter L. Singer, Advanced Manufacturing: The New American Innovation Policies, The MIT Press, 2018</li> <li>8. Paul M. Swamidass, Innovations in Competitive Manufacturing, Springer, 2001</li> </ol> |                |     |               |     |
| <b>Assessment</b> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">1. Assignments</td> <td style="text-align: right;">40%</td> </tr> <tr> <td>2. Final Exam</td> <td style="text-align: right;">60%</td> </tr> </table>  | 1. Assignments | 40% | 2. Final Exam | 60% |
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| 2. Final Exam     | 60%  |                |     |               |     |
| <b>Language</b>   | English  |                |     |               |     |