 

**MODEST Course**

**Research Strand (C1)**

**Commercialization of research results**

**proposed by**

**Brunel University in London, England/** **Tatiana Kalganova**

**Moscow State University of Geodesy and Cartography, Russia/** **Andrei Materukhin**

**Kazan National Research Technological University, Russia/ Dilbar Sultanova**

***“This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein”***

**“Work version” - for purposes of “horizontal” teams working on individual courses:**

**1.1 Course description**

|  |  |
| --- | --- |
| **Course title** | **Commercialization of research results** |
| **Target group** | PhD students |
| **Course aims** | The course aims to develop PhD students’ skills to choose the most promising scenario for promoting their research results to the market, as well as the basic skills for such promotion. |
| **Learning outcomes** | Students will gain skills and abilities:  LO 1: to evaluate the scientific results obtained from the point of view of their possible use by any interested party  LO 2: to estimate economic effectiveness of innovative projects  LO 3: to design a project for research commercialization |
| **Prerequisites and co-requisites** | MSc background |
| **Course content** | 1. Shaping up the research with commercialisation impact.  2. Getting started with commercially valuable research projects.  3. Assessment of the research commercial potential.  4. Business plan of the innovative project. Strategic aspects of the effectiveness.  5. Static and dynamic methods of project evaluation.  6. Risk assessment of the innovation project.  7. Project financing.  8. Packaging project to promote. |
| **Recommended or required reading and other learning resources/tools** | * Peter Thiel, Blake Masters. Zero to One: Notes on Startups, Or how to Build the Future. Virgin Books, 2015 - Business & Economics - 210 pages. * Jerome Schaufeld, Commercializing Innovation Turning Technology Breakthroughs Into Products, Apress, 2015 * John P. MC Manus, Intellectual Property: From Creation to Commercialisation - A Practical Guide for Innovators & Researchers, Oak Tree Press, 2012 * Yasuyuki Motoyama, From Innovation to Entrepreneurship: Connectivity-based Regional Development, ElgarOnline, 2019 * Charles H. Matthews, Ralph Brueggemann, Innovation and Entrepreneurship: A Competency Framework, Routledge, 2015 |
| **Planned learning activities and teaching methods** | **Learning active**: interactions between teacher and students including participation in discussions, team/group exercises, collaborative teamwork, sharing experiences with peers, self-education  **Learning passive**: attending lectures and seminars, listening, watching and reading learning materials  **Teaching** **methods**: giving lectures and presentations, arranging seminars and discussions and brainstormings, receiving feedback on course from students, giving feedback on student’s activities within the course, giving practical assignments or exercises (class/home) – individual and for groups/ teams, promoting critical thinking, constructive critics and self-criticism, stimulating students’ to formulate own opinions, supporting personal responsibility (avoid plagiarism), promoting ethical principles |
| **Assessment methods** | LO 1-3: assessment of proposal/ project by teachers;  LO 1-3: cross evaluation of proposal/project by other students (constructive criticism of presented idea, objectives, workplan with timeline, risks) |

**1.2 Course Structure**

|  |  |
| --- | --- |
| **Course blocks** | **Description** |
|  |  |
| Lectures  Seminars  Homeworks | Lectures:  L 1. Shaping up the research with commercialisation impact. Requirements of the research scope of the PhD. Requirements for the project with industrial or other impact. Shaping up the overall scope of the project with commercialisation value. Challenging the research and commercial values in the project.  L 2. Getting started with commercially valuable research projects. Skills analysis.  L 3. Assessment of the research commercial potential. Determining the market segment and target audience. Creation of value proposal.  L 4. Business plan of the innovative project. Strategic aspects of the effectiveness. Business plan of the project. Concept of the product market life cycle. Lamben multi-attributive model. M. Porter development strategies.  L 5. Static and dynamic methods of project evaluation. Concept of money time value. Static methods for evaluating investment performance. Estimating the break-even point. Dynamic methods of investment evaluation: NPV, PI, IRR, DPP indicators.  L 6. Risk assessment of the innovation project. Project risk assessment. The sensitivity analysis technique.  L 7. Project financing. Venture funds and business angels. Grants. Features of financing various stages of the innovation cycle.  L 8. Packaging project to promote. Development of research funding project.  Seminars:  S1. Critical analysis of research papers in terms of contribution to the science. Critical analysis of research papers in terms of commercialization.  S 2. Development and critical analysis of the skills matrices. Critical path evaluation and shaping up the plan for feasibility study.  S 3. Determining the market segment and target audience for the trainees ' projects. Creation of project value proposal.  S 4. Evaluation of the student's projects according to multi-attribute model. Determining the product life cycle phase and the market entering strategy.  S 5. Theory of R. Kiyosaki cash flow quadrant. Estimating of dynamic indicators of economic efficiency of passive investments (NPV, PI, IRR, DPP) (students' projects).  S 6. Risk analysis of innovative projects. Project risks evaluation using sensitivity analysis.  S 7. Analysis of possible financing methods for students' projects.  S 8. Features of presenting the project for obtaining funding grants. Description of the solution (technology) being promoted to the market and preparation of a presentation.  Homework (individual work on own proposal/ project):  HW1 : To select and analyse a selected research paper in terms of its contribution to science and in terms of commercialization.  HW2 : To make up a plan for feasibility study for a selected research topic including critical analysis of your skills.  HW3 : To present a description of the market segment for the selected research topic based on analysis.  HW4 : To prepare and present a business plan for the project.  HW 5 : To evaluate the project applying different static and dynamic methods.  HW6 : To assess the risks of the project using sensitivity analysis technique.  HW7 : To explore the existing granting opportunities for a research topic.  HW8 : Final Presentation (defense of student’s project for commercialization):  Oral presentation (5-10 minutes) and feedback from professors and other students (5-10 minutes)s |
| Independent work | Students should apply all the methods and techniques of the course to their basic and applied research results developed together with their research supervisor under the research strand. |

**Assessment criteria**

|  |  |
| --- | --- |
| Course assessment | Pass/Fail, 80% attendance and assignment completion required and 100% for completed proposal and oral presentation |

**Assessment criteria**

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Assessment** | **Comments** |
| ***Relevance & Problem Statement***  Why this proposal/ project is interesting, topical and important? | 1. Clearly formulated statement supported with facts/evidence on the chosen research/educational problem;  2. Statement formulated but not fully supported with facts/evidence;  3. Weakly formulated statement with minimum supported facts/evidence. | Link to overview of the previously completed research |
| ***Define Aims/Goal & Objectives***  How the chosen/stated problem is defined? | 1. Clearly defined aims, objectives, research questions according to the problem statement with clearly explained concept and definitions;  2. Not fully defined aims, objectives, research questions according to the problem statement and not clearly explained concept and definitions;  3. 3. Unclear defined aims, objectives, research questions according to the problem statement with no explanation on concept and definitions. | Link to formulation to main aim/goal, specific objectives, research questions |
| ***Proposal Design***  How the chosen stated questions are answered? | 1. Research/educational proposal’s workplan design provides answers to research questions, methodology and data/materials are selected and clearly explained, expected results are proposed and fully described;  2. Proposal’s workplan design partly provides answers to research questions, methodology and data/materials are selected, but not clearly explained, expected results are proposed but not fully described;  3. Proposal’s workplan design does not provide answers to research questions, methodology and data/materials are not correctly selected, expected results do not follow proposed methodology. | Link to proposal’s workplan |
| ***Bibliography***  What sources are used in the proposal preparation? | 1. Original sources (for research/ educational proposals) primary peer-reviewed publications dominate in bibliography;  2. Less than 50% of original sources (for research/ educational proposals) containing primary peer-reviewed publications are included in bibliography;  3. Secondary sources (for research/ educational proposals) dominate in bibliography, lack of primary peer-reviewed publications, less than 10 references/ sources. | Link to overview, methodology, data and methods - reference/ sources |
| ***Presentation***  What is the attractiveness and clarity of the project presentation? | 1. Presentation is accurately prepared/well structured/smart designed, clearly delivered, easily understandable, follows a time interval, and correct answers to given questions.  2. Presentation is not accurately prepared/not well structured, not fully understandable, exceeds presentation time by about 5 min., correct answers are given for half of the questions.  3. Presentation is chaotic, not logical, poorly delivered, exceeds presentation time by more than 5 min., cannot answer questions. | Link to oral presentation |
| ***Methodology***  What methodology, methods or research steps are used? | 1. Chosen methodological approach is clearly and detaily described, and corresponds to the problem statement, research questions, aims and objectives.  2. Methodological approach is not fully described, weakly corresponds to the problem statement, research questions, aims and objectives.  3. Methodological approach is poorly described, and does not correspond to the problem statement, research questions, aims and objectives. | Link to the methodology of the proposed research/ educational project |

**System of assessment:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Points summarized by criteria** | **Grades (ECTS)** | **Russia** | **Belarus** | **Armenia** |
| 5 (6) | 10 (with distinction) | 5+ | 5+ | 5+ |
| 6 (7) | 9 (excellent) | 5 | 5 | 5 |
| 7 (8) | 8 (very good) | 4+ | 4+ | 4+ |
| 8-9 (9-10) | 7 (good) | 4 | 4 | 4 |
| 10 (11-12) | 6 (almost good) | 3+ | 3+ | 3+ |
| 11 (13) | 5 (satisfactory) | 3 | 3 | 3 |
| 12 (14-15) | 4 (almost satisfactory) | 3- | 3- | 3- |
| 13 (16) | 3 (unsatisfactory) | 2 | 2 | 2 |
| 14 (17) | 2 (unsatisfactory) | 2 | 2 | 2 |
| 15 (18) | 1 (unsatisfactory) | 1 | 1 | 1 |

1. **Full description (to be used for implementation of courses at partner institutions)**

|  |  |
| --- | --- |
| **Course provider (institution/ Project)** | MODEST Project:  Brunel University in London, England  Moscow State University of Geodesy and Cartography, Russia  Kazan National Research Technological University, Russia |
| **Title** | **Commercialization of research results** |
| **Target group** | all doctoral students, young researchers,  2nd year MSc students  5th year students of Specialite program (RU & BY) |
| type (compulsory/optional) | compulsory - for PhD students  optional - for MSc students |
| cycle (short/first/second/third) | first cycle - for advanced BSc students (3rd/4th year of BSc programme)  second cycle - for MSc students (2nd year of MSc programme)  third cycle - for PhD students (1st year of PD programme) & PostDocs |
| year of study when the component is delivered, semester/trimester when the component is delivered (if applicable) | This course is recommended to be completed during the spring (2nd) semester of PhD studies. This will be useful support for practical research/ educational and PhD theses/ dissertation defense and for future career. |
| number of ECTS credits allocated (if applicable); estimated workload | 72 academic hours of estimated workload (lectures, seminars, homeworks, group work, independent work and final presentations)  2 ECTS |
| **Name of lecturer(s)** | MODEST partner university  Brunel University in London, England/ Tatiana Kalganova  Moscow State University of Geodesy and Cartography, Russia/ Andrei Materukhin  Kazan National Research Technological University, Russia/ Dilbar Sultanova |
| **Mode of delivery (face-to-face/ distance learning etc.); number of contact hours** | 1. face-to-face in auditorium at MODEST partner universities (lectures - 16 h, seminars - 16 h, final presentations - 4 h)  2. blended (face-to-face and distance) learning at MODEST partner university  3. distance learning |
| **Language of instruction** | Preferably - English; Possibilities - Russian |
| **Course aims** | The course aims to develop PhD students’ skills to choose the most promising scenario for promoting their research results to the market, as well as the basic skills for such promotion. |
| **Learning outcomes** | Students will gain skills and abilities:  LO 1: to evaluate the scientific results obtained from the point of view of their possible use by any interested party  LO 2: to estimate economic effectiveness of innovative projects  LO 3: to design a project for research commercialization |
| **Prerequisites and co-requisites (if applicable)** | MSc background  4 years of Specialitate program |
| **Course content** | Special attention is paid to the theoretical and practical approaches:  1. Shaping up the research with commercialisation impact  *Lectures:*   * Requirements of the research scope of the PhD * Requirements for the project with industrial or other impact * Shaping up the overall scope of the project with commercialisation value * Challenging the research and commercial values in the project   *Practices:*   * Critical analysis of research papers in terms of contribution to the science * Critical analysis of research papers in terms of commercialisation   2. Getting started with commercially valuable research projects  *Lectures:*   * Skills analysis * Feasibility study for the critical path of the project   *Practices:*   * Development and critical analysis of the skills matrices * Critical path evaluation and shaping up the plan for feasibility study   3. Assessment of the research commercial potential.  *Lectures:*  - Determining the market segment and target audience;  - Creation of value proposal.  *Practices:*  - Determining the market segment and target audience for the trainees ' projects;  - Creation of project value proposal.  4. Business plan of the innovative project. Strategic aspects of the effectiveness.  *Lectures:*  - Business plan of the project. Concept of the product market life cycle.  - Lamben multi-attributive model. M. Porter development strategies (dominance on cost, concentration and differentiation )  *Practices:*  - Evaluation of the student's projects according to multi-attribute model. Determining the product life cycle phase and the market entering strategy.  5. Static and dynamic methods of project evaluation.  *Lectures:*  - Concept of money time value. Static methods for evaluating investment performance. Estimating the break-even point.  - Dynamic methods of investment evaluation: NPV, PI, IRR, DPP indicators.  *Practices:*  - Theory of R. Kiyosaki cash flow quadrant. Estimating of dynamic indicators of economic efficiency of passive investments (NPV, PI, IRR, DPP) (students' projects).  6. Risk assessment of the innovation project.  *Lectures:*  - Project risk assessment. The sensitivity analysis technique.  *Practices:*  - Risk analysis of innovative projects. Project risks evaluation using sensitivity analysis.  7. Project financing  *Lectures:*  - Venture funds and business angels;  - Grants;  - Features of financing various stages of the innovation cycle  *Practices:*  - Analysis of possible financing methods for students' projects  8. Packaging project to promote  *Lectures:*  - Development of research funding project  *Practices:*  - Features of presenting the project for obtaining funding grants  - Description of the solution (technology) being promoted to the market and preparation of a presentation |
| **Recommended or required reading and other learning resources/tools** | * Peter Thiel, Blake Masters. Zero to One: Notes on Startups, Or how to Build the Future. Virgin Books, 2015 - Business & Economics - 210 pages. * Jerome Schaufeld, Commercializing Innovation Turning Technology Breakthroughs Into Products, Apress, 2015 * John P. MC Manus, Intellectual Property: From Creation to Commercialisation - A Practical Guide for Innovators & Researchers, Oak Tree Press, 2012 * Yasuyuki Motoyama, From Innovation to Entrepreneurship: Connectivity-based Regional Development, ElgarOnline, 2019 * Charles H. Matthews, Ralph Brueggemann, Innovation and Entrepreneurship: A Competency Framework, Routledge, 2015 |
| **Planned learning activities and teaching methods** | **Learning active**: interactions between teacher and students including participation in discussions, team/group exercises, collaborative teamwork, sharing experiences with peers, self-education  **Learning passive**: attending lectures and seminars, listening, watching and reading learning materials  **Teaching** **methods**: giving lectures and presentations, arranging seminars and discussions and brainstormings, receiving feedback on course from students, giving feedback on student’s activities within the course, giving practical assignments or exercises (class/home) – individual and for groups/ teams, promoting critical thinking, constructive critics and self-criticism, stimulating students’ to formulate own opinions, supporting personal responsibility (avoid plagiarism), promoting ethical principles |
| **Assessment methods and criteria** | LO 1-3: assessment of proposal/ project by teachers;  LO 1-3: cross evaluation of proposal/project by other students (constructive criticism of presented idea, objectives, workplan with timeline, risks) |
| **Version No** | Version #1 |
| **Prepared/amended by** | Brunel University in London, England  Moscow State University of Geodesy and Cartography, Russia  Kazan National Research Technological University, Russia |
| **Approved by** | FirstName, Last Name, Position, MODEST Partner University |
| **Date of approval** | DD Month Year |

**In red:** fields valid for all MODEST courses

**In blue:** fields institution-dependent, relevant for courses for students

**In green:** "technical" part

***Remark:*** *For courses delivered in Russian/Belorussian/Armenian there should be descriptions in English and in the language of instruction*