

International Project Week for Interdisciplinary Research-Oriented Digital Learning Summer 2021 | Syllabus for International Participants



TOPIC	Extraterrestrial Greenhouse Design of a lightweight and efficient system ensuring sustainability of off-world travel and space exploration under reduced/zero gravity conditions
LANGUAGE	English
PREREQUISITES	Enrolled in a university undergraduate or graduate program General interest in Engineering & Life Sciences and interdisciplinary research in an international environment

COURSE SCHEDULE

1. Prep-phase	Basic e-Learning Course
Duration	10 weeks Launch: March 22
Format	Independent self-study of weekly content 'packages'

MODULE DESCRIPTION

The INSPIRED Basic e-Learning Course, based on online materials made available *via* the Moodle platform hosted at TU Darmstadt, gives the participating students of disparate academic backgrounds an overview of the fundamental concepts and state-of-the-art practices of biology, mechanical engineering, and materials science. e-Learning materials are posted online incrementally, in weekly 'content packages'. The provided lecture units are accompanied by dedicated quizzes.

Space travel and exploration comprise the background and provide an added context. Mastering the INSPIRED e-Learning content will prepare the students to tackle challenges of space science missions.

The communication tools available in Moodle (*e.g.*, forum) afford advice and feedback from the instructors as well as discussion between the participants, and contribute to the dynamic development of the 'INSPIRED online community'.

LEARNING OBJECTIVES On successful completion of the course module, students will:

Be familiar with:

- Fundamentals of diverse sub-disciplines of biology
- Central principles of mechanical engineering
- Basics of materials science and engineering
- Project management methods, particularly agile project management

Get insights into:

- Aspects of space technology, design of manned and unmanned missions to planets in our solar system, and future trends in the sustainable exploration of the universe
- Novel techniques revolutionizing the realm of life sciences, such as synthetic biology and gene editing (*e.g.*, CRISPR)
- Approaches and applications integrating multiple disciplines, *e.g.*, 3D tissue printing

Be able to:

- Plan and manage their online study process independently
- Use the functions of a digital learning environment for their learning process, *e.g.*, forum for interaction, quizzes for self-assessment
- Connect with their peers in an international and interdisciplinary environment
- Improve their English language skills

RESOURCES

e-Learning content Available *via* the open-source Moodle platform

EVALUATION

Online evaluation *via* Moodle

GRADING

Pass/fail-based

A pass grade for the Basic e-Learning Course is a prerequisite for participation in the INSPIRED 2021 Virtual Team Project or will be considered for the summer event in 2022 upon successful re-application

2. Do-phase Virtual Team Project

Duration	3 weeks	June 14 – July 2
Format	weeks 1 & 2 week 3	Supervised project work in virtual teams Preparation and realization of the final team presentation and project dossier as well as individual essays

MODULE DESCRIPTION

In the course of the virtual project work, which includes two closely supervised and guided project weeks and an additional self-organized project week, the students have the opportunity to experience project work in a typical (bio-)engineering environment. In remote and distributed international and interdisciplinary teams of 8-10 participants, they develop solutions to a challenging bio/engineering-based problem. In the first two weeks, their team and project work is supported by trained mentors and advisors who promote professional and social learning, whereas specific science questions are addressed by senior faculty members and professors during so-called 'Expert Interviews'. In the final week of their course, the participants have the time and opportunity to refine their interdisciplinary concepts to ultimately present them to the audience of (their peers and) experts. Support is available on request.

The student teams work continuously (synchronously and asynchronously) in a virtual collaborative environment that fosters their communication and work processes.

To complement their multidisciplinary team work, the students will get the opportunity to experience the ESA Lab @ TU Darmstadt – a concurrent engineering facility set in an environment inspired by the mission control room of the European Space Operations Centre. Moreover, the participants will be invited to join the Merck Virtual Experience with live dialogue offered by Merck KGaA, the world's oldest pharmaceutical and chemical company located in Darmstadt, as well as an array of cultural online activities.

LEARNING OBJECTIVES On successful completion of the course module, students will be able to:

- Develop a goal-oriented solution to a complex problem through interdisciplinary project work
- Comprehend and work on an interdisciplinary assignment guided by the driving tenets of mechanical engineering, (synthetic) biology, and materials science in the context of space technology
- Learn and use the functions of collaborative online tools, *e.g.*, video conferencing tools, collaborative whiteboards, collaborative writing and presentation tools
- Facilitate effective virtual collaboration in distributed and remote teams
- Plan, organize, and carry out tasks independently
- Learn and apply project management skills, particularly agile project management
- Discuss possible solutions and reach informed decisions based on relevant criteria
- Present the outcomes of their work to an audience and discuss them competently
- Reflect on and appreciate the academic and social diversity of the international research community
- Hone their English language skills

RESOURCES

Online; deposited on the open-source Moodle platform

- Basic e-Learning Course content Available from May 24
 - Script and project guide Available on kickoff of the Virtual Team Project
 - Supplemental resources Available on request at the Virtual Helpdesk
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EVALUATION

Category/Assignment	%	Assessment
Final presentation: scientific concept	75	Experts: detailed evaluation criteria defined in the script - Team performance
Written team report: dossier	10	Program supervisors/coordinators: template provided in course of the Virtual Team Project - Team performance
Individual contribution: essay	15	Program supervisors/coordinators: template provided in course of the Virtual Team Project - Individual performance

GRADING

Pass/fail-based

Number grades (1.0, very good – 5.0, fail) may be awarded
if required/requested

TRANSFER OF CREDITS

6 CP ECTS

REQUIREMENTS FOR CREDIT ALLOCATION

- Completion of all e-Learning quizzes with at least 51% correct answers by June 6 | 2 CP ECTS
- Active participation in team work, successful final presentation, submission of the team report and individual essay | 4 CP ECTS

We hope the INSPIRED networking platform to help expand our participants' education and career perspectives.

HOMEPAGE

<http://www.inspired-darmstadt.com/>

CONTACT

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