

# Summer School

3-14 August 2020

#sdusummerschool



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- Courses
- How to apply

**SDU** 

University of  
Southern Denmark



# Welcome to the perfect summer

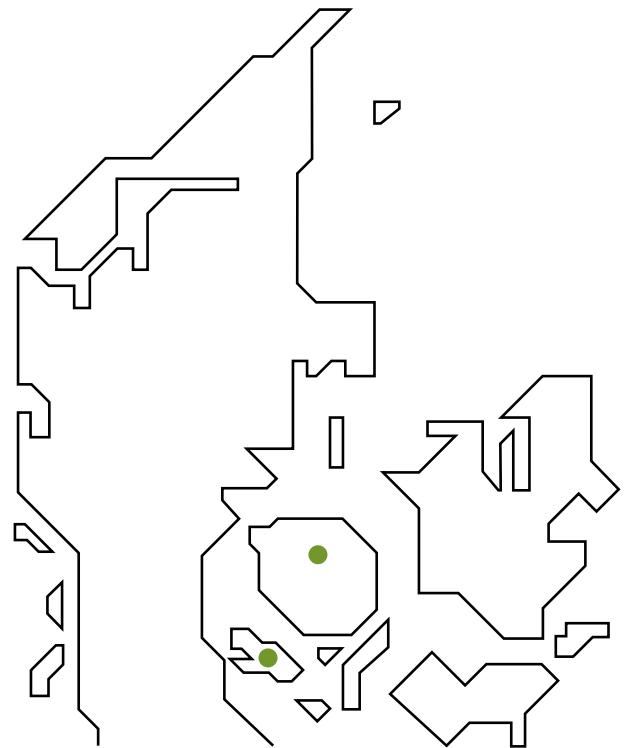
Summer School courses ranging from Drone Technology to Management and Computer Science

The Danish Summer School cities are famous for their state-of-the-art facilities. The robot valley in Odense attracts all kinds of companies as does Sønderborg with the world-famous companies situated here.

At the centre of this high-tech development is SDU with multiple study programmes and extensive research in business, engineering and science. Our rich student life with cafes, concerts, parks and bike lanes across the cities makes it a perfect place to update your skills – and get to know Danish language and culture.

# A summer with state-of- the-art facilities

Spend 2 weeks in Denmark and experience the Danish approach to teaching: Here you will study in state-of-the-art laboratories and meet our most inventive and skilled professors in a study environment that cooperates closely with relevant innovative companies.



# Summer in Denmark

Summertime in Denmark fills the cities with young people. You can BBQ in the park. Or go for a swim in the ocean or the harbour swimming pool. Find new adventures at a local concert. In both Odense and Sønderborg the entire city is bubbling with adventures in August!



## Social life

Your summer school also means weeks of fun, experiencing Scandinavian culture and lifestyle and making new friends.

## Festivals

Odense is famous for the annual H.C. Andersen Festival which transforms Odense into a living fairy tale with theatre performances, street art, concerts, lightshows, art exhibitions, storytelling, street performances and more. Should you have the opportunity to extend your stay after our Summer School, you will get the chance to join in on some of the festivities.

## Meeting fellow students

The cities have a vivid student life: You can hang out with fellow students at the university or take your bike to the city centre.

In Odense you will find a student house in the city centre. It is open for all students every day – even on Sundays. Here you can hang out, meet other international and Danish students, enjoy the café and bar and throw yourself into all the summer activities and events.

## Sightseeing

Odense is home of the famous fairy tale-writer Hans Christian Andersen which makes Odense a charming fairy tale city. Follow his footprints around Odense to be the main character in your own fairy tale.

The beautiful Sønderborg Castle at the waterfront whispers the royal history of this charming, cobbled city at the water.

*Pssst: Check out the traffic lights in the city center of Odense – they have been 'fairytaled'.*

# So much tech

# So much choice



## Hands on

We believe in a hands-on learning philosophy: The more you try yourself, discuss with your professors and develop your own ideas, the better a future employee you will be.

## Work with the industry

Rapidly growing industries are working very closely together with SDU in education, research and development. Odense is known as the robotics hub of Denmark with more than 100 companies working in the field. In Sønderborg big industries draws the development of the city.

## Informal relationships

One of the most noticeable differences for the international students at SDU in Denmark is the informal relationship between students and professors.

This will increase your learning as all questions are welcome.

## Company visits

SDU has close ties to many companies, working together on research and development and student activities. Some courses will include visits to some of these highly interesting companies.

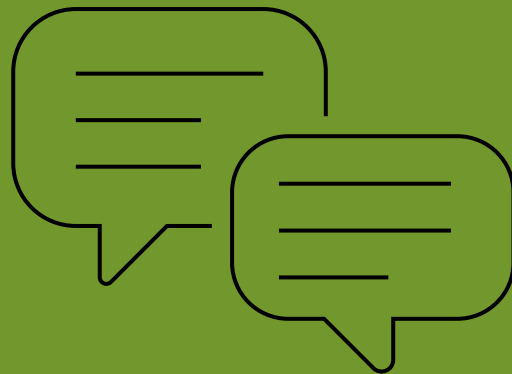


## Small groups! Intense learning!

Learning in small groups gives you the opportunity to discuss with your fellow students and ask your professors questions. This makes learning more intense and allows you to experiment with your new knowledge.

## International classes

A summer school gives you a unique opportunity to enhance your international profile and improve your network. All courses are taught in English.



## Close to everything

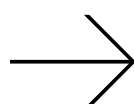
The university is close to everything; your accommodation is just around the corner. The city with cafés and shopping is close to the university in both Sønderbrog and Odense. Beautiful nature is just waiting for you all around.



# Where to stay?

You will live close to the university in both Odense and Sønderborg.

We help you find the perfect place during your Summer School. Of course, it will be close to the city, close to the university and close to your fellow Summer School students.



Let us help you find a place to stay:  
[sdu.dk/summerschool](https://sdu.dk/summerschool)

# Courses

## Business and Economics

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### Market Design

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Traditional economic policy is incremental, concerned with taxes and subsidies; Market Design is revolutionary. In this class we learn about building social institutions from the bottom up, to solve problems like student-to-school assignment and organ transplant matching. The solutions we find can also be applied within firms and even teams.

→ Offered in Odense by: Department of Business and Economics

### Decision, Persuasion and Negotiation

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Study the rationales that drive human behavior and the common biases that affect the quality of decisions. Understand cultural differences, avoid common pitfalls, and become more effective in decision making, persuading, and negotiating. Learn the most common persuasion techniques and negotiation strategies through case studies, games/experiments, and role-play simulations.

→ Offered in Odense by: Department of Department of Marketing and Management

## Business and Economics

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### Banking and Financial Markets Law

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The course provides students with an in-depth understanding of the legal issues that arise in banking regulation and law. The course aims to investigate the recent developments in banking law, with the new legislation put in place at international and EU level in the aftermath of the crisis.

→ Offered in Odense by: Department of Law

### Financial Modelling and Practice

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This purpose of the course is that the students can implement some important financial models with extensive use of computer software, for example, Excel/VBA, or other programming languages agreed between the instructor and student, and develop modelling skills for analyzing a variety of financial decision problems by using real-world data. The student obtains competencies to master modelling techniques such as regression analysis, optimization, Monte-Carlo simulation, and binomial trees; and, the student can apply these modelling skills in specific financial contexts such as portfolio management, option pricing, financial risk management, sensitivity analysis in discounted cash flow models and term-structure estimation.

→ Offered in Odense by: Department of Business and Economics



## Chemistry, Chemical and Environmental Engineering

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### Biomass and biofuel technology

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Learn about state-of-the-art biofuel technologies of waste biomass conversion and its smart industrial processes. Understand energy potential of waste biomass and get insight into holistic strategies of biomass utilization through zero-carbon approach for a sustainable CO<sub>2</sub> neutral technology.

→ Offered in Odense by: SDU Biotechnology

### Chemical Biology

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In this diverse course, students will learn about the molecular origins of biological processes by applying chemistry to the “building blocks of life” and implement this knowledge in the space of smart therapeutics, biomolecular structure and function, and drug delivery systems.

→ Offered in Odense by: Department of Physics, Chemistry and Pharmacy

### Engineering for Sustainability

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The course provides you with skills for understanding the challenges of sustainable development. You will get an introduction to Environmental System Analysis theory, methods and tools. You will learn when and how to apply such methods to the engineering tasks of assessing and designing sustainable solutions. We apply a systems approach throughout the course, and you will get insight in some of the societal frameworks and concepts to sustainability as well as the concept of Cleaner Technology/ Best Available Technology and its role in EU environmental regulation.

→ Offered in Odense by: SDU Life Cycle Engineering

## Civil and Architectural Engineering

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### Experimental Architecture with Computational Design and Digital Fabrication

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The Summer School will focus on exploring ideas and producing design artifacts as answer to fundamental driving questions: what kind of tectonic configurations can be enabled by means of digital fabrication? How do we realize high-performance architecture with it? How can we build bespoke architecture in a sustainable way? Adopting a design/make approach, catalyzed through tailored computational techniques, various structural configurations will be investigated. The school outcomes will be contributing to the creation of an atlas of digitally fabricated tectonic prototypes.

→ Offered in Odense by: Civil and Architectural Engineering

### Urban Resilience

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The summer school aims at providing the participants with the latest knowledge on urban resilience research, practice and policies through lectures; and to co-develop their skills and knowledge on planning for urban resilience using Odense’s real-life experience and challenges as a living laboratory, through a problem-based workshops.

→ Offered in Odense by: Civil and Architectural Engineering

## Electrical Engineering

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### Modelling and Simulation of Electrical and Electromechanical Dynamic Systems

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Simulations tools are getting smarter and quicker, and in the years to come they will be taking over and/or improve a lot of laboratory tests for development and prototyping of revolutionary new products. The objective is to introduce modelling of dynamic systems with focus on electrical and electromechanically systems, and to simulate response under different situations and with different impacts. You will develop mathematical models for systems such as motors, inverted pendulums, electrical cars etc.

→ Offered in Odense by: SDU Electrical Engineering

### Design of Electronic Circuits

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In this course you will gain a solid theoretical understanding of electrical systems. There will be lectures in both electrical and mechanical topics and you will work with development of a Motor Steering Unit and a Battery Charge Control. You will develop and characterize an electronic circuit board, supporting the operation of an electro-mechanical system and learn to apply simulation results in practice. Main topics are: Electromechanical Analysis, Electromagnetic Compatibility, Printed Circuit Board design.

→ Offered in Sønderborg by: CIE - Centre for Industrial Electronics

## Innovation, Product Development and Design Engineering

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### Manufacturing Technologies and Business Model Innovation in the Age of Sustainability

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Implementing sustainability along with new technologies within innovative business models requires a holistic perspective paired with specialized knowledge. We investigate smart manufacturing and business model innovation in light of the SDGs. The ultimate outcome for you is in-depth knowledge you can use to develop novel technology-related business ideas while keeping sustainability as a guiding principle in mind.

→ Offered in Sønderborg by: SDU Technology Entrepreneurship and Innovation

### Engineering Imagination

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The mission of this interdisciplinary creative program is to transform engineers into experience designers through the study of tangible fantasies. During the course, students in small teams will conceptualise, develop and test a concept for a Tangible Fantasy - a clear, definite and real idea with no current basis in reality: The creation of an improbable thing.

→ Offered in Odense by: SDU Innovation and Design Engineering

# Innovation, Product Development and Design Engineering

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## Health Tech Innovator

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In a series of lectures, we will take participants through the important parts of the innovation process in healthcare and relevant technologies, from wicked problems, user-driven innovation, entrepreneurial foundational theories and innovation management tools for aligning entrepreneurial processes with solving real life problems to Intellectual property rights (IPR) and CE marking (health, safety and environmental standards) for products sold within the European Economic Area.

→ Offered in Odense by: SDU Innovation and Design Engineering

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## Innovation and R&D in multinational companies

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This workshop will address global innovation and R&D management in multinational firms from strategic and operational perspectives, including managing a global R&D network, setting up R&D centers (e.g. Silicon Valley, China) and growing their performance, managing cross-border innovation processes, leveraging reverse and frugal innovation (e.g., from India), tapping into the innovation potential in emerging economies, transnational new product development project management, and competing with emerging market innovators. We will use several case studies (IBM, SAP, Nestle, Goodbaby, Huawei, etc.). Students will be expected to read, understand, and apply both conceptual papers from academic journals in e.g. JIBS and Research Policy as well as managerial concepts published in e.g. HBR and SMR. Some basic innovation and NPD knowledge will be required; if not available those can be covered by pre-readings.

→ Offered in Odense by: Department of Marketing and Management

# Manufacturing and Management Engineering

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## Project Management

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You will learn how to analyze projects and project processes, and as a result, contribute to the accomplishment of projects. You will obtain insight into the project management discipline and its concepts and assumptions, and will be able to utilize the knowledge obtained to work out a project mandate with matching analyses and plans. You will learn to evaluate project descriptions, analyses and plans worked out by others. Furthermore, you will be able to independently follow-up on analyses and plans, and in the light of these provide proposals for an appropriate management effort.

→ Offered in Odense by: SDU Engineering Operations Management

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## Six Sigma

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A major part of quality management and cost optimization is quality or process improvement. Of the many methods available, Six Sigma is currently one of the more popular methods. In this course you will learn the Six Sigma method and be able to apply this in practice.

→ Offered in Odense by: SDU Engineering Operations Management

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## Sustainable Development Goals and Global Production Systems

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The aim of the summer school course is to zoom in on the SDGs in general and in particular on the challenges pertaining to implementing them in global production systems/operations as well as how to overcome the challenges.

→ Offered in Odense by: SDU Engineering Operations Management

## Mechanical and Mechatronics Engineering

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### Design of Electromechanical Systems

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In this course you will gain a solid theoretical understanding of Mechatronics Systems. There will be lectures in both electrical and mechanical topics and you will work with development of a Control Mechanism for Brake System and simulate/test Aerodynamics and Heat Transfer. You will develop mechanical and electrical systems supporting the operation of an electromechanical system and learn to apply simulation results in practice. Main topics are: Computer Aided Design, Finite Element Methods, Electromagnetic Compatibility and Printed Circuit Board, Solar Cell Technology

→ Offered in Sønderborg by: SDU Mechatronics

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### Applied Composite Drone Manufacturing

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The composite lab at the Danish drone center offers various composite manufacturing technologies and materials to build different types of drones. The range of processes spans from additive manufacturing with composite materials over to filament winding and vacuum infusion. Natural fibers, like flax, offer sustainable composites but also glass and carbon fibers could lead to flying solutions.

→ Offered in Odense by: SDU Mechanical Engineering

## Mechanical and Mechatronics Engineering

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### Experimental Fluid Mechanics

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This course introduces methods and techniques for measurement and data analysis in experimental fluid mechanics, e.g. study of aerodynamic in wind tunnel and hydrodynamics in pipes and ducts. You will go through dimensional analysis, flow similarity and model studies, design and analyses of experiments and Experiences with different measurement technologies for experiments in fluids. You will learn to plan and conduct experiments in fluids and document the results from laboratory experiments.

→ Offered in Odense by: SDU Mechanical Engineering

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### Additive Manufacturing

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The objective of the course is to break down the knowledge barriers, by an overall introduction to the Additive Manufacturing processes and technologies. In collaboration with industrial cases you will create a strategic mindset of where and how to apply additive manufacturing applications. Based on an Additive Manufacturing action plan the course will explore the "design for additive" concept, bridging ideas to printing technology leading to a final industrial result. You will develop skills in both designing, printing and evaluating the additive manufacturing components.

→ Offered in Odense by: SDU Mechanical Engineering

## Physics, Energy and Engineering Physics

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### Introduction to Nano-optics

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This course introduces analytical tools used to model and understand the behavior of light in atoms and materials that are structured on small scales. We will review simple concepts of electromagnetism, relating far and near-field microscopy, propagating and evanescent waves, as well as linear and nonlinear response theory. These concepts will be applied to study light-matter interactions in quantum light emitters and low-dimensional systems, with special emphasis on plasmon- and exciton-polaritons in 2D materials for applications in optical sensing, all-optical transistors, and quantum information technology.

→ Offered in Odense by: SDU Nano Optics

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### Complex system modelling & simulation for intelligent energy systems

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The underlying objective of this program is to give hands-on experience about energy management system along with fundamentals of system modeling. In this program you will learn about various aspects of energy system and modeling challenges. You will understand various key components of energy system, such as demand response, energy flexibility analysis and multi-agent system modeling.

→ Offered in Odense by: Center for Energy Informatics

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### The million dollar question at the heart of astrophysics, climate physics and mathematics

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Do you want to unlock the secrets hidden in the Navier-Stokes equations? In this summer school you will study the physics and mathematics of the Navier-Stokes and Jeans equations. You will derive the equations starting from the basic laws of physics and apply them to problems in galactic dynamics and dark matter as well as the climate.

→ Offered in Odense by: Department of Physics, Chemistry and Pharmacy

## Political Sciences and Public Administration

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### Quality education and human capital: building resilient societies

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Quality education and human capital - the knowledge, skills, traits and attributes embodied in real human beings - are the key driver of the wellbeing of people (micro) and nations (macro). This is true both for today's knowledge economies and developing economies; it is likely to be even more true for building sustainable and resilient societies in tomorrow's automated, globalized economies. Why are human capital and quality education - and Sustainable Development Goal 4 - so important? Beyond policy input thinking, how to open the black box of quality here - what precisely is quality education in the light of future labor markets? What are the roles of cognitive skills and noncognitive traits in this? What is the ideal bandwidth of future-able skills? How to boost creative, adaptive and resilient young minds? Which policies are most likely to be effective in boosting these various dimensions, and which reforms are needed? Why should states invest in people, and how can they do so smartly? We study Nobel Prize winning economists such as Paul Romer, Gary Becker, and James Heckman, as well as leading political scientists, sociologists and education policy scholars to understand and answer these key questions for sustainable societies.

→ Offered in Odense by: Department of Political Sciences and Public Administration

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### Regulating the Future: The EU and the Global Sustainable Development Goals

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The aim of the course is to understand how the EU works and how it can meet the challenges it faces and achieve the Sustainable Development Goals against the backdrop of a world shaped by ever more rapid technological changes. The course will represent an innovative interfaculty approach to learning about the EU and how the EU can be used to meet the challenges facing both Europe and the rest of the world today and in the future. The course aims to break down disciplinary silos and to present a structure facilitating cooperation between students from different academic backgrounds, by encouraging them to take an interdisciplinary approach to critical global sustainable development problems.

→ Offered in Odense by: Department of Political Sciences and Public Administration

## Robotics and Drone Technology

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### Biologically inspired robotics

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You will be introduced to biologically-inspired approaches to robotics – embodied artificial intelligence, neurorobotics and biorobotics. You will learn how neurons for sensing and control in the biological brain work and their equivalent models as well as how to build simple brains for robots. You will also learn how neurons in the brain adapt their behaviour to changes in the environment and control the body accordingly. Finally, you will learn how to model mechanisms of biological learning and apply them to build simple brains for robots.

→ Offered in Odense by: SDU Embodied Systems for Robotics and Learning

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### Robots in context

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This course will give you an overview of the commercially available robots and their application areas, the research activities at the university in robot technology, including artificial intelligence. You will be introduced to essential robot activities such as path planning and surface treatment as well as robot vision systems.

→ Offered in Odense by: SDU Robotics

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### Introduction to Unmanned Aerial Systems Technology

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This course will teach you the basics of drone technology hardware, software and systems. You will get an introduction to the UAVs theories and technologies followed by laboratory exercises in SDU Drone Lab and SDU UAS Test Center. You will build and fly a multirotor UAV outside at the airport. Focus will be on integration of components and subsystems required for a drone platform.

→ Offered in Odense by: SDU UAS Centre

## Software Engineering and Computer Science

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### Continuous Delivery and DevOps

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During the course you will learn to apply software engineering practices and tools from professional software developers. The course in Software Delivery and DevOps is organized by Praqma and SDU and you will get tips and tricks on how to use Git, Docker, Jenkins and more. You will learn to: 1. Construct a continuous delivery pipeline and apply it on a small software project, 2. Apply professional tools for build, test, and deployment automation, 3. Demonstrate DevOps mindset, 4. Compare Continuous Delivery and DevOps with other software engineering approaches, describe their prerequisites, benefits and barriers, 5. Explain how continuous delivery can support innovation experiments and value creation.

→ Offered in Odense by: SDU Software Engineering

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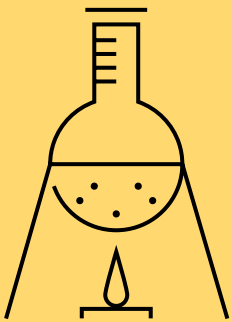
### Deep Learning

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Machine learning has become a part in our everyday life, from simple product recommendations to personal electronic assistant to self-driving cars. Especially deep learning has gained a lot of interest in the media and has demonstrated impressive results. This intensive course will introduce you to the exciting world of deep learning. We will learn about the theoretical background and concepts driving deep learning and highlight and discuss the most noteworthy applications of deep learning but also their limitations. Furthermore you will also apply and implement your first deep neural networks in order to solve various interesting machine learning tasks.

→ Offered in Odense by: Department of Mathematics and Computer Science

# 5 reasons to choose the SDU Summer School



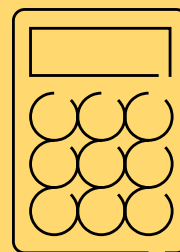
**1. State-of-the-art facilities and laboratories**



**2. Hands-on learning philosophy**



**3. Work closely with inventive industries**



**4. Earn 5 ECTS**



**5. Great social life**

# Summer School





A perfect place to update  
your skills – and get to  
know Danish language  
and culture



# Free admission

## Have a great summer for free

(we are not kidding!)

Exchange students from a partner university pay no tuition. Ask your international coordinator if your university is a partner university – and help nominate you for SDU Summer School.

Guest students pay tuition fees. For tuition rates and more information please refer to the website or contact us at [summerschool@sdu.dk](mailto:summerschool@sdu.dk)

# How to get here

It is really easy →  
to get here

**By plane:**

Two international airports are located close to both Odense and Sønderborg: One in Copenhagen and one in Billund.

**By train:**

Travel by train and enjoy the flat Nordic landscape on your way. The train stations in both Sønderborg and Odense are located in the middle of the city close to the harbour, shopping, cafes close to the university.

**By bike:**

Yes, Denmark is too far away to reach by bike. But when you get here you will realize why Denmark is internationally praised for its many bike lanes. Rent a bike during your stay and join your fellow students in the bike lanes.

# Want to apply?

Find more information  
about the Summer School  
at SDU and our courses at  
[sdu.dk/summerschool](https://sdu.dk/summerschool)

## Facts:

Dates: 3 - 14 August 2020

Venue: SDU Campuses in Odense or Sønderborg

Level: Advanced Bachelor 5 ECTS

Fee: Free for exchange students

## Admission & Practical stuff

SDU International

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