Applied composite drone manufacturing – Welcome, introduction & course objective

Agenda

- Welcome
- Course
  - Learning goals
  - Lecturing style
  - Organisation
  - Blackboard – study software platform
- SDU drone center and composite lab
- Drone challenge
- Summer course – additional activities

Welcome!

- You are warmly welcomed to our course “applied composite drone manufacturing”
- We will spend two weeks of our summer working in teams, having fun together and connect between cultures while learning about composite manufacturing and drones.
- I look forward to encouraging you along this exciting journey of learning and discovery.

Welcome – get to know each other

- Introduction of lecturers, helpers and roles during the course
  - Yasser Hannan (lecturer)
  - André Rangel de Sousa (lecturer and student helper)
  - Anders Dyreborg Schmidt (student helper)
  - Martin Antkowiak Jensen (student helper)
  - Dylan Cawthorne (SDU drone specialist)
  - Raphael Geiger (lecturer)
- Who are you? Tell us a few words about you
  - Name, study background, university, background with drones& composites, wish for this course,..

Learning goals of the course

- Within the team you'll learn how to evolve your drone by choosing the optimal design, composite materials and manufacturing processes.
- Thanks to your engagement you'll have your international teamworking skills improved.
- Learn and educate your team members within your project group.
- After you participated in this course you will have an overview about composite materials and manufacturing as well as drones. We will spend two weeks of our summer working in teams, having fun together and connect between cultures while learning about composite manufacturing and drones.

Lecturing style

- Group based self driven student work
- Applied and hands on lab work (with assistance)
- Your group has major focus at this lecture!
  - You will spend most of your time in your work group
  - You will learn the most within your group work time
  - The better you exchange the more you benefit from each other
  - Responibility of each group member to teach your mates:

  Morning lectures; your background, your group work experience
- We will lecture you the needed basic theory
- Lets have fun together

Lecturing style

- Students role
  - We will teach you about the basic theory the course
  - -> Please ask proactive deeper knowledge and tools to achieve your goals – we are here to help you!
  - Always follow the safety instructions and the education team members! We work with serious materials

Lecturing style

- Group role
  - Main teaching body during the course. Evaluation will also mostly be group based – the team counts!
  - Offers different roles for members (project planning, craftmanship, idea generation and research about you topic, video planning and taping,

Lecturing style

- Evaluation in line with lecturing
  - You will create different videos about your project as well as your group and yourself. The result will be graded.
  - This evaluation method was chosen as it reflects your study progress in a more suitable way than “ordinary” evaluation methods like written/oral exams.
  - Further you could think about the video as a tool for your ongoing study journey and beyond - for example
    - Virtual business card and the way you work and learn in teams
    - As a start to continue further projects in the group you’ve been working
  - You are welcome to use and share the video after evaluation

Lecturing style – evaluation method

- Grading within the video 40% team project, 40% reflections on your learning experience, 20% video creation style – more details follow and will be shared with you
- Video taping during entire project in each group
  - Use your smartphone
  - Hand in in a common video format
- Anybody doesn’t like to be video taped within this course?

Organisation

To note on board / available also online at blackboard

- Schedule (next 2 slides)
- Transport
- Food
- Data and information handling

Organisation - Data and information handling

- We’ll handle information within blackboard university software (I guess you’ve got a quick intro at the general information meeting this morning)
- Relevant information will be available for you there as well about:
  - Course organization
  - Course content
- You are welcome to share your groups data/information within blackboard as well (each group will have international and SDU students. SDU students please assist in using the software

SDU UAS Center – composite Lab

Drone challenge - The aim of the course

- The aim of the course is to develop and manufacture your individual composite drone in each team.
- Each student team will get a different drone-built kit, based on a foam made drone. After a quick built up phase and the composite teaching each team develops a composite material build improvement to transform their foam drone into a more performant drone by smart use of composite materials and applying their knowledge.
- All students will get a basic theory teaching and got special skills teaching offered during the project phase. Teams have the freedom to develop their ideas and manufacture their individual designs within the given time and with the available technologies. We are there to support you anytime achieving your ideas!

Drone challenge - Composite and drones

- Drones come in various forms and shapes. The purpose of flying requires smart constructions and lightweight materials, such as composites.
- 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.

Drone challenge - Realistic goals and project planning

- Within our discussions with the SDU students drone team we found that the design and build of a drone from scratch would be far too much for a two-week course. The student team with 10 members needed 5 months to get to a flying prototype. Because of this we decided to base the composite drone building process on tested flying platforms.
- Further disciplines in drone manufacturing like electronics and software development are not directly part of the course – with flying drone platforms students can focus on creating their applied composite drones

Drone challenge - How to achieve this goal Project planning

Tipps:

Choose an improvement that is realistic to design, built, implement and test fly in your given time (project group work time ~ 1 work week)

Visualize a project plan and crosscheck your progress during

- Evaluation:

1. Project plan explained and followed up in the groups video
2. Finished improved drone by Thursday, 15th August afternoon.
3. Flying improved drone Thursday, 15th August afternoon.

Drone challenge - How to achieve this goal Innovative solutions

Tipps:

We are starting with a “flyable” drone based on foam. Think how special materials, fibres and composites can help to improve your “standard” solution. What fibre material and arrangement, how many layers and what kind of matrix material is optimal for your individual idea? How can the different processes support your plans?

Each group got another drone to start with – that allows for specific solutions regarding your plane as well. An optimal solution takes both parts into account.

Evaluation:

1. Reflections on the video why your solution makes good and specific use of the used materials and manufacturing processes as well as your specific type of drone.
2. How innovative (technically new) and challenging to implement is your solution?
3. Theoretical preparations of your composite improvement

Drone challenge - How to achieve this goal Practical implementation of your solution

How did you work with the composite materials? Have you found technical improvements/learnings/tricks how to work with the materials and processes?

1. Reflections on your practical project work and personal learnings on the groups video
2. Practical manufacturing/implementation of your composite parts/improvement.
3. Technical combination with your given foam drone.
4. Improved performance of your drone on ground and airborne