RowanUniversity
DIGITAL ENGINEERING HUB (DEHub)

UNIVERSITY OF THESSALY

Digital Design & Advanced Manufacturing Summer School (DDAM)

The **Digital Design & Advanced Manufacturing Summer School** (**DDAM)** is a pilot education program between the Digital Engineering Hub (DEHub) at Rowan University (RU) and the Department of Mechanical Engineering in the University of Thessaly (UTH). DDAM emphasizes both theoretical and applied elements to support student learning by providing a 'hands-on' experience. Students participating in this program are introduced to modern aspects of digital design and advanced manufacturing which include an introduction to: a digital product design workflow leveraging advanced/hybrid manufacturing methods, design optimization methodologies, additive manufacturing and quality assessment.

The program structure is explained in brief in ***Figure 1***. Specifically, DDAM includes a level setting pre-program called Module 1 which provides curated online resources (e.g., tutorials and documentation) to student participants in this program and allows them to prepare for the onsite instruction in Module 2. The in-person component includes both lectures and hand-on project-based learning activities based on a curriculum that caters to DDAM. Beyond the synchronous and onsite instruction, the summer program concludes with a Module 3 during which students can implement their ideas into projects of their choice.

DDAM will be taught by Prof. Antonios Kontsos, Director of DEHub and Professor in the Department of Mechanical Engineering in Rowan University's Henry M. Rowan College of Engineering, assisted by a team of faculty, staff and students from both RU and UTH.

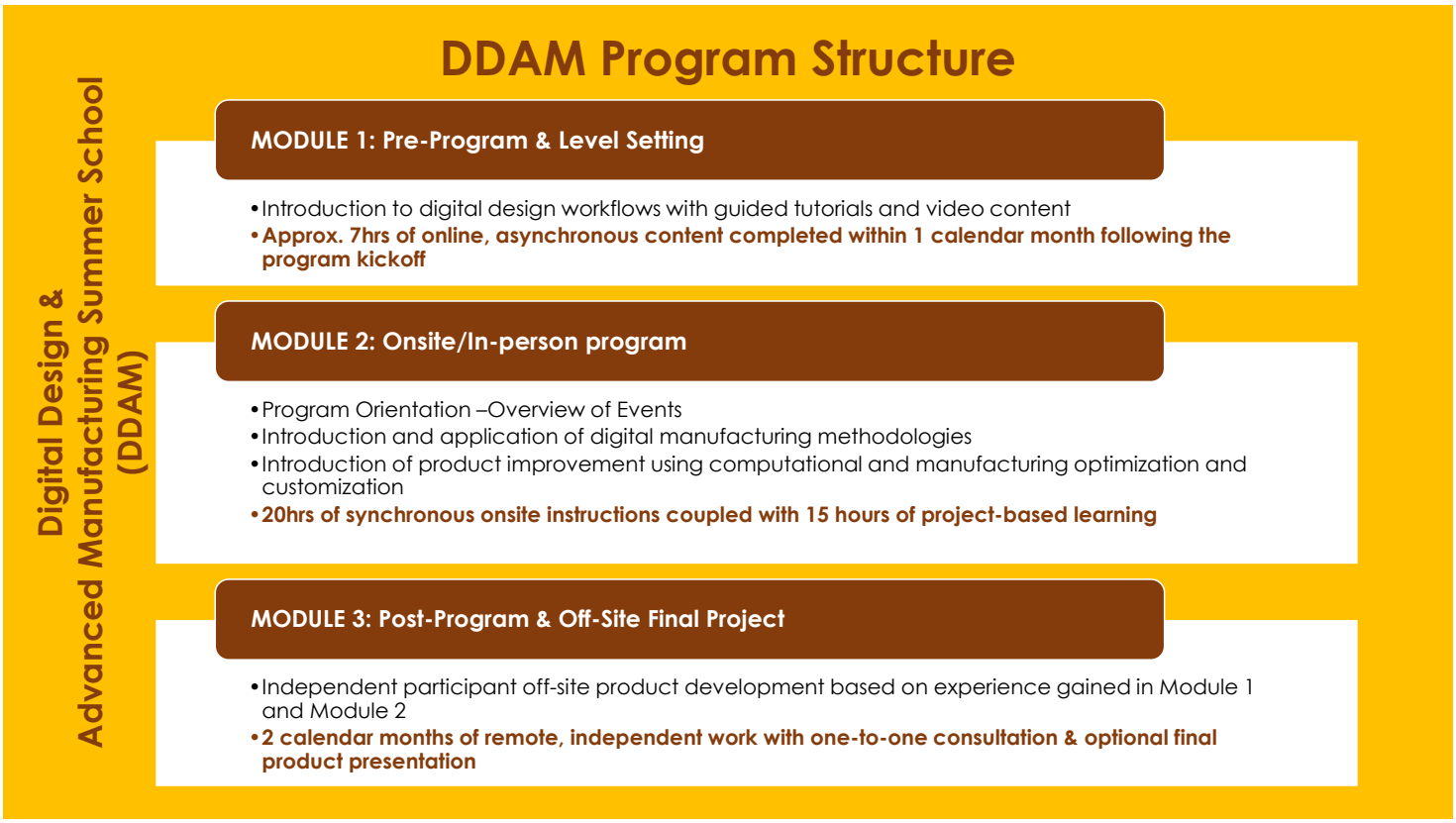

Figure 1: The structure of the DDAM summer school.

Figure 2 provides a more detailed breakdown of the technical concepts presented in DDAM. Specifically, Module 1 exposes students to CAD & CAE concepts with emphasis on 3D modeling. Then Module 2 builds on these concepts by providing additional tools to improve design by using concepts of simulation, optimization, and manufacturing. Connections to testing and quality control, as well as discussions on modern design for manufacturing workflows used in industry are made. To demonstrate the above, a drone design is used from the beginning to the end of the course as a testbed that allows students to contextualize the information presented.

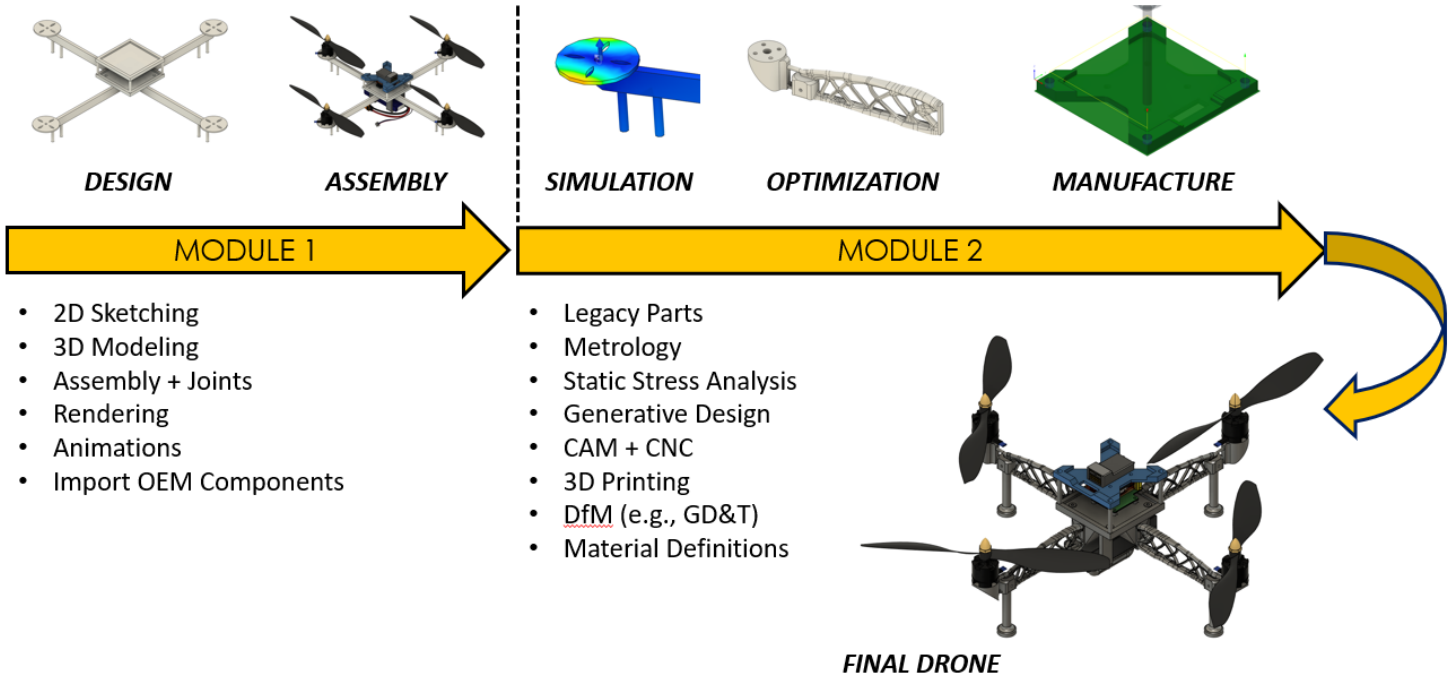

Figure 2: The example used in Modules 1 and 2 to demonstrate the DDAM concepts.

Students in this program work both independently and within groups to allow understanding of the technical skills introduced, as well as their integration in a project-based approach. A parallel implementation of theory concepts both computationally and experimentally assists students to explore the presented information in an experiential framework that gets instantly transferrable to applications of their choice.

Beyond classroom activities, students participating in this program will have the chance to be introduced to several technological concepts related to advanced manufacturing, including software, hardware, computing, testing, and sensing. In addition, visits to local industry and flash talks on selected cutting-edge topics, are planned to spark enthusiasm on the presented concepts and to support an innovation competition which will run in parallel with the program and which will culminate with group presentations and an award ceremony.

To deliver the content included in the DDAM, resources, facilities and personnel from UTH will be used in addition to computational resources provided by DEHub. All students receive a certificate of completion upon successful submission of all requirements in Modules 2 and in Module 3.