MINOR SPDAM

Minor SPDAM Regulations - 2022-2023

1. Name minor:

Smart Product Development Additive Manufacturing (SPDAM)

2. English name:

Smart Product Development Additive Manufacturing (SPDAM)

3. Content of minor

The minor Smart Product Development with Additive Manufacturing (SPDAM), an in-depth technical minor on 3D-printing. You will achieve competences –a combination of practical and theoretical knowledge, practical and cognitive skills, and behavior and values– enabling you to work in an additive manufacturing (AM) environment. The program learning goals are stated below:

- You will learn about the possibilities and limitations of AM-machines, and how to help companies (e.g. high tech industry, medical) to implement this new production technology.
- You will attain skills in the engineering design process:
    - systematic approach from function to solution,
    - in the field of mechanical, thermal, and flow product structures.
- You will be able to use specialized software packages for drawing, modelling, analysis, and simulation.
- You will learn about selecting materials and production technologies, and gain skills to operate different types of AM-machines and associated equipment:
    - properties of a machine
    - material science tests
    - occupational health and safety issues

Unit	Contents
Theory module	**Design for Additive Manufacturing (DFAM)** Design guidelines, Topology optimization, Economic aspects, Killer application identification (practice).
Practicals module	**Practical Skills for Additive Manufacturing (PSAM)** Hands-on experience in the lab with AM-equipment, Reverse engineering, Production preparation, Post processing, Testing materials and printed parts, Using specialized software (e.g. Materialise Magics), Occupational health and safety issues.
Theory module	**Production technology and Materials (PM11)** Properties of materials for AM, Heat treatment, Testing of materials. Conventional (lathes, milling, welding) versus additive processing, Different types of AM-machines, Support structures, Production flow.
Computer Module	**Stress analysis and Optimization (CM11)** Background and practical skills in finite element method. Modelling, analyzing, and optimizing mechanical stress by topology optimization in a product using professional software.
Computer Module	**Heat and Flow analysis (EP11)** Principles of heat and flow transfer. Theoretical background and practical skills in finite element method. Modelling and analyzing heat and/or flow, e.g. in a heat exchanger or injection mold, using professional software.
Project	**Integrated Product Development (IPDAM)** Project assignment from different companies (High Tech Systems, Medical, or General), which involves analyzing, designing, building and testing a product in which AM can deliver a superior solution.

3.1 Summary for diploma supplement

The minor Smart Product Development with Additive Manufacturing (SPDAM) is an in-depth technical minor on 3D-printing where learned a combination of practical and theoretical knowledge, practical and cognitive skills, and behavior and values– enabling to work in an additive manufacturing (AM) environment. The possibilities and limitations of AM(-machines), and how to help companies (e.g. high tech industry, medical) to implement this new production technology.

4. (Admission) restrictions of the minor

Minor SPDAM: maximum of 32 students
(if the classroom is used at the BIC, the maximum number of students will be maximum 22 students)

Closing date is November 1.
Students are selected on the date of registration.

At the beginning of December, all students will be contacted whether they are participating in the minor.

5. Education components (see article 16 general section of the TER)

Code	Title / Examination	Study load and contact hours
DFAM DFAM1 DFAM2	**Design for Additive Manufacturing** Written exam (individual) 100 minutes Re-designed part, presentation, report	**DFAM: 112 hours total = 5.6 hr/week**
PSAM PSAM1 PSAM2	**Practical Skills for Additive Manufacturing** Practical assignments and participation Practical assignments and participation	**PSAM: 112 hours total = 5.6 hr/week**
PM11 PM11T1 PM11T2	**Production technology and Materials** Written exam (individual) 100 minutes Written exam (individual) 100 minutes	**PM11: 112 hours total = 5.6 hr/week**
CM11 CM11P1 CM11P2	**Stress analysis and Optimization** Practical assignments Project + written exam (individual) 100 minutes	**CM11: 112 hours total = 5.6 hr/week**
EP11 EP11P1 EP11P2 EP11P3	**Heat and Flow analysis** Practical assignment heat Practical assignment flow Project	**EP11: 112 hours total = 5.6 hr/week**
IPDAM	**Project Integrated Product Development with Additive Manufacturing**	**IPDAM: 280 hours total = 14 hr/week**

6. Enrolment in the education components

Does not apply n.v.t.

7. Overview of tests and registration for tests (see articles 18 and 22 general section of the TER)

Code	Title / Examination	Grading
DFAM DFAM1 DFAM2	**Design for Additive Manufacturing** Written exam (individual) 100 minutes Re-designed part, presentation, report	**(DFAM1 + DFAM2) / 2 = ≥ 55%** Grade: 10 - 100% Grade: 10 - 100%
PSAM PSAM1 PSAM2	**Practical Skills for Additive Manufacturing** Practical assignments and participation Practical assignments and participation	**(PSAM1 + PSAM2) / 2 = ≥ 55%** Grade: 10 - 100% Grade: 10 - 100%
PM11 PM11T1 PM11T2	**Production technology and Materials** Written exam (individual) 100 minutes Written exam (individual) 100 minutes	**(PM11T1 + PM11T2) / 2 = ≥ 55%** Grade: 10 - 100% Grade: 10 - 100%
CM11 CM11P1 CM11P2	**Stress analysis and Optimization** Practical assignments Project + written exam (individual) 100 minutes	**(CM11P1 + CM11P2) /2 = ≥ 55%** Grade: 10 - 100% Grade: 10 - 100%
EP11 EP11P1 EP11P2 EP11P3	**Heat and Flow analysis** Practical assignment heat Practical assignment flow Project	**EP11P1 + EP11P2='sufficient', then EP11 = EP11P3** Grade: insufficient / sufficient Grade: insufficient / sufficient Grade: 10 - 100%
IPDAM	**Project Integrated Product Development with Additive Manufacturing**	**IPDAM = ≥ 55%** Grade: 10 - 100%

- Written exams are provided in the English language.
- Enrolment for the exams (regular & resit) are automatically done by the organization for all students

8. Passing the minor (see article 19 (3) general section of the TER)

See table, section 6. All parts (DFAM, PSAM, PM11, CM11, EP11 and IPDAM) of the minor must be completed successfully. Sign up through Kies op Maat (https://www.kiesopmaat.nl), each module within be terminated whit a 5.5 or higher and the endscore will be:
((DFAM score/840x112) + (PSAM score/840x112) + (PM11 score /840x112) + (CM11 score/840x112) + (EP11 score /840x112) + (IPDAM score /840x280) = Endscore minor SPDAM

9. Examination Board (see article 38 general section of the TER)

Exam committee Mechanical Engineering
E-mail: examencommissie-engineering@fontys.nl

10. Validity

This information applies to the academic year 2022 - 2023

11. Entry requirements minor

Entry requirements based on an engineering/technical bachelor study, such as Mechanical engineering, Mechatronics, Automotive, or Applied Physics.
The student must be registered with one of the aforementioned studies and have completed the propedeuse.

12. Not accessible for

Students from programs other than **Mechanical engineering, Mechatronics, Automotive, or Applied Physics*** are excluded from participation.

*See section 11.