Course description

Applied Thermodynamics
2021-2022
22 September 2021

course:	Applied Thermodynamics EXMEAEP3
semester:	ME2-S4EX
credits:	5.00
course coordinator:	Aduda, Kennedy (k.aduda@fontys.nl, 'atv')

description course content

Thermodynamic Properties: enthalpy, entropy, vapour content, work and thermodynamic efficiency.
Open Systems Analysis
Second Law of Thermodynamics
Directions of Heat Transfer& Work done
Entropy & Quality of a mixture
T-s diagram, p-V diagram and log (p)-h diagram
Thermodynamic Cycles based on Properties of State, the First Law, and Second Law of Thermodynamics.
Carnot, Brayton, Otto and Diesel Cycles
Refrigeration, Heat pump, Steam Turbine Plant, Gas turbine plant & Combined Cycle Power Plant

required prior knowledge

no specific prior knowledge required

learning materials

title	edition	author	publisher	ISBN/number
Fundamentals of Thermal-Fluid Sciences (SI Units)	5e (jun 2020)	Cengel, Y.	McGraw-Hill	9789813310094

test matrices

Remember = Can remember, regognize and repeat information
Understand = Can interpret and explain information in his/her own words. (This tests understanding and insight)
Apply = Can use information to accomplish an activity and/or to solve a problem
Analyze = Can examine information
Evaluate = Can evaluate information, make choices
Create = Can use information to develop new products/information

*In the actual test, the weight of a learning objective may deviate up to 5% from this test matrix. This is not the case if a range is used. In a practical assessment that results in a non-numeric grade (pass/fail or good/sufficient/fail), no numeric weights are filled out, only the letter V.

EXMEAEP3P Applied Thermodynamics Practical Assignment	level						weight (%)*
Learning objective / The student is able to	**remember**	**understand**	**apply**	**analyze**	**evaluate**	**create**	
To undertake measurements in an experiment set-up using available instrumentations and test rigs for energy processes in devices and systems such as: Compressors, Turbines, Heat exchangers, Refrigerating machines, Heat pumps, and Boilers	✔	✔	✔	✔	✔	✔	0-40
To perform thermodynamic calculations based on the First Law & second law of thermodynamics as applied to the measurements in the practical experiments.	✔	✔	✔	✔	✔	✔	0-40
To be able to write reports based measurements and calculations based on the practical experiments.	✔	✔	✔	✔	✔	✔	0-20
							100

resources per test:

EXMEAEP3T1 Applied Thermodynamics Written Exam	level						weight (%)*
Learning objective / The student is able to	**remember**	**understand**	**apply**	**analyze**	**evaluate**	**create**	
To be able to describe and undertake thermodynamic analysis and calculations using the following quantities: enthalpy, entropy, vapour content, work and thermodynamic efficiency.		✔	✔	✔	✔	✔	0-15
To apply the first law of thermodynamics in calculations for analysis of open systems, taking into account kinetic and potential energy.		✔	✔	✔	✔	✔	0-15
To be able to explain the implications of the second law of thermodynamics.		✔	✔	✔	✔	✔	0-15
To be able to graphically illustrate positive and negative energy flows in open systems for thermodynamic cycles.		✔	✔	✔	✔	✔	0-15
To be able to graphically illustrate positive and negative energy flows in closed systems for thermodynamic cycles.		✔	✔	✔	✔	✔	0-15
To be able to define the state of a system through the additional state variables such as entropy and vapour content/quality of a mixture.		✔	✔	✔	✔	✔	0-15
To be able to use T-s diagram, p-V diagram and log (p)-h diagram for calculations and analyses of thermodynamic states, processes and cycles.		✔	✔	✔	✔	✔	0-15
							100

resources per test:

EXMEAEP3T2 Applied Thermodynamics Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
The student is able to describe processes in thermodynamic cycles based on properties of state, the first law, and second law of thermodynamics.			✔	✔	✔	✔	0-20
The student can explain and apply the principles in calculations for the following thermodynamic cycle processes: Carnot, Brayton, Otto and Diesel.			✔	✔	✔	✔	0-30
The student is able to describe, explain, perform calculations on anlysis and operating principles for refrigeration, heat pump, the steam turbine plant, the gas turbine plant and the combined cycle power plant; and being able to choose a practical model for the calculation of these plants (i.e. with real gasses and liquids).			✔	✔	✔	✔	0-30
The student can apply h-s diagrams to determine property of states in processes and use the same for thermodynamic analysis and evaluation.			✔	✔	✔	✔	0-15
The student can graphically illustrate, and apply the principle of isentropic efficiency in thermodynamic analysis and calculations.			✔	✔	✔	✔	0-15
							100

resources per test:

assessment criteria

name of test	type of test	assessment type	assessment scale	prerequisites	norm/compensation
EXMEAEP3P	Practical Assignment	Duo	Passed / Failed	n/a	EXMEAEP3 = (EXMEAEP3T1 + EXMEAEP3T2) / 2 ≥ 5,5 provided that EXMEAEP3T1 ≥ 4,5 and EXMEAEP3T2 ≥ 4,5 and EXMEAEP3P = Passed
EXMEAEP3T1	Written Exam	Individual	1,0-10,0	n/a	
EXMEAEP3T2	Written Exam	Individual	1,0-10,0	n/a	

Course description

Customer Oriented Innovation
2021-2022
22 September 2021

course:	Customer Oriented Innovation EXHE20
semester:	ME2-S4EX
credits:	5.00
course coordinator:	Kollenburg, van Peter (P.vanKollenburg@fontys.nl, 'atv')

description course content

required prior knowledge

no specific prior knowledge required

learning materials

title	edition	author	publisher	ISBN/number

test matrices

Remember = Can remember, regognize and repeat information
Understand = Can interpret and explain information in his/her own words. (This tests understanding and insight)
Apply = Can use information to accomplish an activity and/or to solve a problem
Analyze = Can examine information
Evaluate = Can evaluate information, make choices
Create = Can use information to develop new products/information

*In the actual test, the weight of a learning objective may deviate up to 5% from this test matrix. This is not the case if a range is used. In a practical assessment that results in a non-numeric grade (pass/fail or good/sufficient/fail), no numeric weights are filled out, only the letter V.

EXHE20 Customer Oriented Innovation Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

assessment criteria

name of test	type of test	assessment type	assessment scale	prerequisites	norm/compensation
EXHE20	Written Exam	Individual	1,0-10,0	n/a	EXHE20 ≥ 5,5

Course description

Forming, DoE and AM
2021-2022
22 September 2021

course:	Forming, DoE and AM EXMEAPM3
semester:	ME2-S4EX
credits:	5.00
course coordinator:	Gielen, Ton (T.Gielen@fontys.nl, 'atv')

description course content

• MEAPM3T1 theory CAD/CAM-machining and RapidPrototyping
• MEAPM3P1 practical Rapid prototyping &CAD/CAM
• MEAPM3T2 theory forming and Design ofExperiments (DoE)
• MEAPM3P2 practical forming
• MEAPM3P3 computer practical DoE

MEAPM3T1 and MEAPM3P1:
Expansion of fundamental knowledge aimed at theselection of production processes in the design phase, deepening in productiontechniques and application in a practical environment, among whichCAD/CAM-machining and Rapid prototyping/manufacturing.
The interaction"design-fabrication-material" aimed at the manufacturability ofproducts plays a central role in the subjects to be dealt with. Attention isalso paid to the fixing of tools in High Speed machining processes in relationto the occurring machining forces during production. The student has to supply:
*** A FDM to be printed solid**
*** A STL file of this solid**
*** A STEP file of this solid**
*** A 2D drawing with main dimensions of the solid**

MEAPM3T2 and MEAPM3P2:
Expansion of fundamental knowledge about metalforming, specifically aimed at cold and hotforming of metals. Considered are upsetting, hot extrusion, ironing and deepdrawing and rolling as well as drawing materials and their properties.
Practical bending and tensile/compressive test todetermine strain hardening exponent.

MEAPM3P3:
Optimization of machine settings in manufacturingprocesses using Design of Experiments.

required prior knowledge

MEAPM1 en MEAPM2 (Propaedeutic Phase). A sufficient result for MEAPM1 and MEAPM2 is not required to participate in MEAPM3, however sufficient knowledge and skills from both courses are supposed.

learning materials

title	edition	author	publisher	ISBN/number

test matrices

Remember = Can remember, regognize and repeat information
Understand = Can interpret and explain information in his/her own words. (This tests understanding and insight)
Apply = Can use information to accomplish an activity and/or to solve a problem
Analyze = Can examine information
Evaluate = Can evaluate information, make choices
Create = Can use information to develop new products/information

***In the actual test, the weight of a learning objective may deviate up to 5% from this test matrix. This is not the case if a range is used. In a practical assessment that results in a non-numeric grade (pass/fail or good/sufficient/fail), no numeric weights are filled out, only the letter V.**

EXMEAPM3P2 Forming, DoE and AM Practical Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
Being able to assess and reason whether a forming process is suitable for the production of a certain product.			✔				0-30
Being able to perform the experiment accurately and reliably.					✔		0-30
Being able to make connections between forming concepts and experimentation.			✔				0-30
Being able to summarize the results of the experiment in graphs and tables.			✔				0-30
Being able to (statistically) process the results of the experiment.				✔			0-30
Being able to critically assess the results of a forming experiment.					✔		0-30
Being able to write a concise report of an experiment.						✔	0-30
							100

resources per test:

EXMEAPM3P3 Forming, DoE and AM Practical Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
Being able to calculate and interpret basic statistical concepts in Excel: sample, average, variance and normal distribution. Being able to draft and evaluate test hypotheses with the F-test.					✔		15
Being able to apply the least squares method with Excel. Being able to calculate variances and to make statements about the test hypotheses with the F-test and the t-test. Being able to set up a regression function and to be able to calculate and interpret the correlation coefficient. To be able to evaluate the relevance of Outliers, such as Cook's distance, DFIT and box plot.					✔		15
Being able to set up a test design for a realistic problem, to be able to investigate the influence of main and interaction factors, to detect interactions between the different factors, to calculate the coefficients of the response function, in a (fractional) factorial test design.				✔			15
Being able to detect and avoid entanglement: design matrix, skills in Minitab, fractional factorial test design, (standardized) residues, resolution of a test design.				✔			15
Being able to select and apply a (fractional) factorial test design in Minitab and choose tools (Paretoplot and semi-normal plot) to assess the quality of the test design based on the statistical significance of factors.						✔	15
Being able to independently analyze an industrial process with DOE and being able to determine the optimal settings of the process, employing interactions, the degree of fractionation and (the elimination of) entanglements. This results in a model function.						✔	25
							100

resources per test:

EXMEAPM3T1 Forming, DoE and AM Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
Being able to distinguish rapid prototyping processes and making choices.					✔		35
Being able to create an STL file of an NX CAD model.			✔				15
Being able to understand 3D printing including metal printing.		✔					15
Being able to apply CAD / CAM process.			✔				15
Being able to optimize the process of high speed milling.					✔		20
							100

resources per test:

EXMEAPM3T2 Forming, DoE and AM Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
Being able to name, explain and apply forming concepts.			✔				0-20
Being able to recognize and name the components of a forming process and explain forming processes (such as upsetting, extruding, deep drawing, ironing and rolling).		✔					0-20
Being able to establish connections between forming concepts and manipulating them mathematically.			✔				0-20
Being able to establish connections between forming concepts and a forming processes.			✔				0-20
Being able to draw the stress-strain history of a cold or hot forming process in a true stress-strain curve.			✔				0-20
Being able to calculate true stresses, true strains and forces for hot or cold forming processes.			✔				0-20
Being able to calculate the work and power of a hot or cold forming process.			✔				0-20
Being able to assess and reason whether a forming process is suitable for the production of a certain product.					✔		0-20
							100

resources per test:

assessment criteria

name of test	type of test	assessment type	assessment scale	prerequisites	norm/compensation
EXMEAPM3P2	Practical Assignment	Duo	Passed / Failed	n/a	EXMEAPM3 = (EXMEAPM3T1 + EXMEAPM3T2) / 2 ? 5,5 provided that EXMEAPM3T1 ? 5,5 and EXMEAPM3T2 ? 5,5 and EXMEAEP3P2 = Passed and EXMEAEP3P3 = Passed
EXMEAPM3P3	Practical Assignment	Duo	Passed / Failed	n/a	
EXMEAPM3T1	Written Exam	Individual	1,0-10,0	n/a	
EXMEAPM3T2	Written Exam	Individual	1,0-10,0	n/a	

Course description

Machine Elements
2021-2022
22 September 2021

course: Machine Elements
EXMEACM4
semester: ME2-S4EX
credits: 5.00
course coordinator: Samsam, M'hamed (m.samsam@fontys.nl, 'atv')

description course content

required prior knowledge

no specific prior knowledge required

learning materials

title	edition	author	publisher	ISBN/number
Shigleys Mechanical engineering Design (Engelse Eenheden)	11e	Budynas, Richard	McGraw-Hill	9781260569995

test matrices

Remember = Can remember, regognize and repeat information
Understand = Can interpret and explain information in his/her own words. (This tests understanding and insight)
Apply = Can use information to accomplish an activity and/or to solve a problem
Analyze = Can examine information
Evaluate = Can evaluate information, make choices
Create = Can use information to develop new products/information

*In the actual test, the weight of a learning objective may deviate up to 5% from this test matrix. This is not the case if a range is used. In a practical assessment that results in a non-numeric grade (pass/fail or good/sufficient/fail), no numeric weights are filled out, only the letter V.

EXMEACM4P1 Machine Elements Practical Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

EXMEACM4P2 Machine Elements Practical Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

EXMEACM4P3 Machine Elements Practical Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

EXMEACM4T1 Machine Elements Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

EXMEACM4T2 Machine Elements Written Exam	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

assessment criteria

name of test	type of test	assessment type	assessment scale	prerequisites	norm/compensation
EXMEACM4P1	Practical Assignment	Duo	I-S-G	n/a	MEBCM4 = (MEBCM4T1 + MEBCM4T2) / 2 ≥ 5,5 provided that MEBCM4T1 ≥ 4,5 and MEBCM4T2 ≥ 4,5 and MEBCM4P1 = S or G and MEBCM4P2 = S or G and MEBCM4P3 = S or G
EXMEACM4P2	Practical Assignment	Duo	I-S-G	n/a	
EXMEACM4P3	Practical Assignment	Duo	I-S-G	n/a	
EXMEACM4T1	Written Exam	Individual	1,0-10,0	n/a	
EXMEACM4T2	Written Exam	Individual	1,0-10,0	n/a	

Course description

Project Integrated Product Development
2021-2022
22 September 2021

course:	Project Integrated Product Development EXMEAHE6P
semester:	ME2-S4EX
credits:	10.00
course coordinator:	Reuijl, David (D.Reuijl@fontys.nl, 'atv')

description course content

required prior knowledge

no specific prior knowledge required

learning materials

title	edition	author	publisher	ISBN/number

test matrices

Remember = Can remember, regognize and repeat information
Understand = Can interpret and explain information in his/her own words. (This tests understanding and insight)
Apply = Can use information to accomplish an activity and/or to solve a problem
Analyze = Can examine information
Evaluate = Can evaluate information, make choices
Create = Can use information to develop new products/information

*In the actual test, the weight of a learning objective may deviate up to 5% from this test matrix. This is not the case if a range is used. In a practical assessment that results in a non-numeric grade (pass/fail or good/sufficient/fail), no numeric weights are filled out, only the letter V.

EXMEAHE6P Project Integrated Product Development Assignment	level						weight (%)*
Learning objective / The student is able to	remember	understand	apply	analyze	evaluate	create	
							0

resources per test:

assessment criteria

name of test	type of test	assessment type	assessment scale	prerequisites	norm/compensation
EXMEAHE6P	Assignment	Individual and Group	1,0-10,0	n/a	EXMEAHE6P ≥ 5,5