CARDIOVASCULAR FITNESS MACHINE

potential user /brand/market context

- Lifestyle Personal Fitness – *Preventative-Healthcare Technology*
- Post-Trauma Rehabilitation – *Healthcare Technology*
- School Digital Laboratory – *Learning Technology*

DESP:2000 CAD for Products Designers 2:

Project 2 2019/20

Digital-Prototype-Modelling of a cardio-vascular fitness-machine

Virtual Prototype Modelling Processes

Product Proposal PORTFOLIO PUBLICATIONS

Study Weeks	Lecture Series 1hr per week	TUTOR DIRECTED STUDY 1.5 hrs per week: Digital Prototyping Process Phases	Recorded Tutorials + Published PDF tutorials	SELF-DIRECTED STUDY 8.5 hrs per week
Week 15 11/01/2021	**Project Process Overview Digital Prototyping of Functional Performance** *Solidworks Analytical Tools Video Based proposal Narratives*	***SW Motion Study Linkage + Structure Modelling***	*Modelling 'structural rig' of the existing product configuration Prepare a base animation of the movement limits*	**GENERATE SKETCHBOOK PRO SCALED RENDERED ELEVATIONS** Based on the existing product configuration generate concepts visuals of re-designed product brand form Use a generic brand as direct reference Nike / Gym Shark / Oakley/ Speedo
Week 16 18/01/2021	**Application of Digital Analytical Tools in Product Development**	***Solidworks Framework Form Modelling***	*Modelling a brand re design of the 'structural rig' of the existing product configuration*	**UNDERTAKE MODELLING OF STRUCTURAL ELEMENTS AND PRIMARY MOTION FUNCTIONS** – movement scope and range Apply re-brand-design culture from inserted Sketchbook Pro- renders
Week 17 25/01/2021	**Iterative Digital Modelling in optimising functional performance**	***Solidworks FEA***	*Modelling a test of the load-structural capacity and balance of the lift function*	**UNDERTAKE MODELLING OF GEAR TRAIN** – consider assembly issues, usability and manufacturability
Week 18 01/02/2021	**Gearing Principles, Types and SW gear mate feature**	***Solidworks Gear-mate***	*Modelling a gearing assembly and animating gearing advantage*	**COMPLETE A SCHEMATIC MODE OF THE GEAR-TRAIN** – undertake a motion study to demonstrate performance parameters
Week 19 08/02/2021	**Detailing of engineered mechanisms as SW models**	***Modelling Sub-Assemblies***	*Modelling bearing subassemblies of a handle- drive acting on a gearing mechanism*	**COMMENCE RESOLUTION OF THE DIGITAL PROTOTYPE** Resolve finalisation of Master File details, part-files sand sub-assembly files. ARCHIVE FILES
Week 20 15/02/2021	**BS888 standards and the contemporary alternative – Model Based Definition**	***BS:8888 overview*** *Review on GA's + Part Files + Sectional Details Dimensions*	*Review case study of tech drawings submission – Strategy for Layout of GA, Component, Sub-Assemblies*	**DEVELOP GENERAL ASSEMBLY MODEL** - Based on part Files + sub-assemblies, plus the Master-File. ARCHIVE FILES
Week 21 22/02/2021	***BS:8888 Tolerances +*** **Tolerancing Strategies**	***BS:8888 Tolerances + Tolerancing Strategies*** for general assembly, sub-assembly and single part components	*Case Study Exercises Dimensioning of drawings and applying Tolerancing of Geometry, Dimensions and assembly fits*	**GENERATION OF MBD REFERENCES** Dimensioned and annotated ASSEMBLY 3D PDF PARTS 1DPDFs **DIMENSIONING AND SCHEDULE OF TOLERANCES** *on geometry, dimensions and fits across all drawing sheets*
Week 22 01/03/2021	EMPLOYABILITY WEEK		PROGRAMMED ACTIVITIES	
Week 23 08/03/2021	**Compiling Proposal Technical Drawings + Specification Notation**	***SW Visualise scripted animations***	*Generating scripted animations of product functions + performances*	**PARAMETRIC MODELLING PROCESS** *PDF 20 X A3 PAGES Portfolio Publication*
Week 24 15/03/2021	**Compiling Product Proposal Video Narratives**	***Adobe Premier*** *Compositing multiple-aspect video presentations*	*Compile video narratives of product form, interactions and performative functions*	**SCRIPTED ANIMATION PROPOSAL FUNCTION** *Generating scripted animation of your proposal product function + performance*
Week 25 22/03/2021	PROJECT WEEK TO PREVIOUSLY RECORDED **Bonus Lecture** *SW - Topology Optimisation*	*Technical Drawings Submission uploaded 09:00am 16/03/2020* **Technical Drawings Presentations – see tutorial slots Groups C & D**		**PORTFOLIO PUBLICATIONS PUBLISHING** *Compile video narrative of product form, interactions and performative functions – use animations, stills, apply timed-annotation*

DESP:2000 PROJECT 1 *- PARTS A + B submission*

MONDAY - 21:00hrs 22nd MARCH 2021

DESP:2000 PROJECT 2 *weeks 15- 25 total study hours 100 hours – approximately*

MODULE WEIGHTING – 50%

CARDIOVASCULAR FITNESS MACHINE PARAMETRIC VIRTUAL PROTOTYPE + PRESENTATION

This project will further the principle techniques, methodologies and process established in Project 1 A + B. The complexity of mechanical functional and movement are integral to the product form which will be virtually prototyped. The range of digital evaluations will involve mechanical efficiency, fatigue testing and an in-depth LCA study

The Virtual prototype will be developed so has to have 3 different configurations (design versions) using varying materials, forms + functions, technical specifications and brand identities

This project will serve a key preparation of your virtual prototyping practices in readiness for Graduate Year Design Practice and or Placement / Internship design practice

In addition, the project will further develop the range of formats and channels for presenting and communicating both virtual prototypes and also your CAD practices. A range of presentational contexts will be considered across range audience types – self, design team, client, potential employers. Time based media will constitute the larger part of this project activity

PROJECT 2 PART A 40% Project Weighting

Shall focus on the form + feature generation offered parametric modelling software in developing mechanical functionality and motion study visualisation + analysis

This will include developing a methodical and logical management of a

1/ parametric data set (feature tree manager)

2/ preparation and organisation of a ***parametric data file set*** connected parametric file set which will include three principle features

- master model
- part models
- assembly model
- Digital evaluation of parametric virtual prototypes

and forms of design editing including refinements corrections and amendments – the focus of the variability will be on the 3 configurations

Part B will focus on design presentation which principle emphases being on visualising, presenting and evaluating the motion aspect of the product function + performance.

This will follow on to the overall communication and presentation of design proposal, whereby the parametric virtual prototype is the basis for generating visual images, time-based narratives and technical drawings. These will be generated, composed and published with intent of adding to a personal portfolio of CAD practices.

Ultimately this will progress onto a communicating the professional level of CAD practises, collated in the form of a focused proposal presentation and more generally as a CAD practice portfolio

in addition to the expected visual communication of motion, mechanical function, form images technical specification, you will also be preparing a recorded voice over of the above-mentioned proposal presentation

This is to further facilitate your ability to communicate on the level of a design team, client context and to the wider design industry community

SUMMARY SUBMISSION REQUIREMENTS

PROJECT 1

PART A – 40% project weighting

Effectiveness of Parametric Modelling Process

Development of mechanical functions

Application of FEA Digital Evaluation Tools

Generation of Digital Motion Study

PART B – 60% project weighting

Log of Parametric Modelling Process
Master / Part / Sub-Assembly/ Assembly Models

Visualisation of Function Motion Study + Recorded Animation

Application of FEA / LCA / Costing Digital Evaluation Tools

Presentation of Technical Specification Drawings - MBD

SUMMARY SUBMISSION DEADLINE

WEEK 25

MONDAY 21:00 HRS 22nd March 2021

BLACKBOARD UPLOAD + FILE SHARING PORTAL

DESP:2000 - CAD for Product Design II - 2020/21

Project 2 – Summative Assessment FB Sheet

Product Proposal VIRTUAL PROTOTYPE EVALUATION + PROPOSAL SPECIFICATION

CARDIOVASCULAR FITNESS MACHINE

DELIVERABLES CHECKLIST:	Student Check	Assessor Check
Set of Manufacturing Specification BS:8888 Drawings / Tolerancing schedule / MBD version		
Parametric Model Sequence – master Model, Part Models, Sub-Assembly model and Assembly Model		
Animation of Product Functions		
Proposals Functional Analysis + Life Cycle Analysis		
Proposal Consumer Value Differencial + Consumer Usability Visualisation		

A++ 96-100	A+ 79-77	A 76-73	A- 72-70	B+ 69-67	B 66-63	B- 62-60	C+ 59-57	C 56-53	C- 52-50	D+ 69-47	D 46-43	D- 42-40	F 39-30	F 29-0

STUDENT NAME:

module component	MARKING CRITERIA:	project element weighting	module LO's	attainment marks
Parametric Virtual Prototyping Process 40%	***Effectiveness of Parametric Modelling Process***	10%	1,2,3, 4,5,6,7	
	Development of mechanical functions	10%		
	Application of FEA Digital Evaluation Tools	10%		
	Generation of Digital Motion Study	10%		
Proposal Specification Log Presentation + Animation 60%	***Log of Parametric Modelling Strategy Master / Part / Sub-Assembly/ Assembly Models***	10%	1,2,3, 4,5,6,7	
	Visualisation of Function Motion Study + Recorded Animation	25%		
	Application of FEA / LCA / Costing Digital Evaluation Tools	10%		
	Presentation of Technical Specification Drawings MBD	25%		
Module Weighting 50%	*Mark descriptors are the University's marking framework for assessment. Based on generic criteria, they cover a broad range of disciplines. Use of the descriptors is supported by full guidance can be found in your Subject & Programme Guide (Marking Criteria). The generic mark descriptors form part of the University's regulations*		Project Grade	

Assessor | Moderator

PROJECT SUBMISSION DEADLINE Monday 19:00 22nd March 2021

DESP:2000 PROJECT 1

PARTS A + B submission

MONDAY - 21:00hrs 22nd MARCH 2021

project deliverables

PROJECT 2 PART A

completion - week 19

GENERATION OF MODELLED 'PROPOSAL' - MASTER MODEL
SW MODEL

GENERATION OF MODELLED 'GEAR-TRAIN' MECHANISM
SW MODEL

GENERATION OF MODELLED 'FEA' STUDIES
SW MODEL

GENERATION OF MODELLED 'MOTION' STUDIES
SW MODEL

PROJECT 2 PART B

PARAMETRIC FILE SET MASTER - PARTS - ASSEMBLY
PDF PORTFOLIO PUBICATION-01
20 X A3 PAGES
+ SW FILE SET

PROPSOAL MOTION FUNCTION
VIDEO PORTFOLIO PUBLICATION-02
2 MINUTE VIDEO PRESENTATION

DIGITAL ANALYSIS VOP
VIDEO PORTFOLIO PUBLICATION-03
10 SLIDES 2 MINUTES

TECHNICAL SPECIFICATION - MBD
3D PDF - PORTFOLIO PUBLICATION-04
COLLATION OF MULTIPLE 3D PDFS - ASSEMBLY + PARTS