Faculty of
Computing, Engineering
and Mathematical Sciences

BRISTOL

BSc (Hons) Creative Product Design

Definitive Documentation

February 2002

Overview and Background to the proposed award :

The design and creation of an artefact can be motivated by many factors. However the predominant focus of this new award is towards artefacts that are designed for a competitive consumer marketplace. Furthermore, this award is concerned with products where there is a high degree of user interaction. Such products can be categorised using three principal parameters: Cost, Functionality, and Aesthetic appeal. The competitive success of a product often requires these three (frequently conflicting) parameters to be finely balanced.

Traditionally, awards in this area partition these dimensions. Hence, for example, engineering faculties concentrate on the functional aspects of products, business faculties will concentrate on factors associated with cost and finance and fine arts faculties will concentrate on aesthetics. Many academic institutions have introduced awards that reflect this institutional partitioning. Hence there are a number of awards in product design in the UK that are aimed at concept design but pay little attention to the means by which the products will be realised in the industrial and manufacturing context. There are also product design awards that have emerged from within traditional engineering faculties and hence have an emphasis on the functional aspects of design activity rather than the creative or concept activities.

This award attempts to achieve a different emphasis. This award aims to place the aesthetic aspects (and underlying creative activity) of product design on an equal footing to the other two product dimensions. The award proposed is built upon the integration of the creative process with a study of the technological means by which products can be realised allied to a firm understanding of business and market issues.

Dr John Lanham
Dr Jim Scanlan

October 2001

Section 1 : Basic Data :

i) Programme Title and Descriptors

Creative Product Design

ii) Final and Intermediate awards

BSc(Hons)
BSc(Hons) Sandwich
Diploma of Higher Education
Certificate of Higher Education

iii) Credit Requirements

In line with the University's Modular Assessment Regulations students will be required to attain 360 credits. It is also required that not less than 100 credits are at Level 3, (or above), and not less than 100 are at Level 2,(or above) and not less than 140 are at Level 1 (or above).

iv) Modes of Delivery

Full-time, Part-time, Sandwich

v) Parent Faculty

Computing, Engineering and Mathematical Sciences

vi) Month and Year of First Intake

September 2002

vii) Professional Body Issues

N/a

Section 2 : Award Structure :

The award is a 3-year BSc Honours award. It is anticipated that students may wish to specialise in three broad areas of product design; mechanical products (such as medical devices, sporting equipment, furniture, kitchen equipment), mechatronic products (such as toys, mobile phones, music devices) and “soft” products (such as user interfaces, animation, information systems, educational/training systems). The award as currently proposed encompasses the generic and key creative and design elements necessary to underpin work in all these areas. Specialisation will be possible through both the individual project and group design projects will provide the opportunity for students to define the focus of their choice.

Level of study I :

The first level of study introduces students to nature of design. It explores the constraints and boundaries of the topic in general. It uses a historical context to give a firm understanding of the principles of design activity. Students will start to use the design tools that will become increasingly important in the later years of the course. Students will be given a general understanding of materials science and the associated manufacturing processes. A number of structured design projects will be undertaken and these will be used to introduce a range of creative processes, design issues and presentation perspectives.

Level of study 2 :

In this level of study students will start to take responsibility for their own creative progress through student-led self-directed study. Students will begin to exercise career and professional choices. Students will participate in group design projects where they will learn to exploit a wide range of media and techniques in order to present ideas. Students will gain practice in embodying ideas and will use the very wide range of production processes available in the faculty to produce prototype designs. Students will develop skills in objective and subjective critical appraisal and the assessment of ideas. Students will develop strong presentation and communication skills through “design and produce” design studies.

Industrial Work Placement :

Upon completion of the first two level of studies students can opt to spend a period of time working in industry. The sandwich year will provide a number of opportunities for students to apply skills and knowledge acquired in level of studies one and two as well as develop wider, generic, professional skills.

Level of study 3 :

A major proportion of the final year is taken up in an individual project this will enable students to focus the core of their studies in an area or domain of product design that most appeals to them. Students may choose to exploit the Faculty’s very strong links with local companies in order to base their project on a real industry based design problem. The award will conclude with a design show where students will present their design work to an invited audience of industrialists and design experts. The students will collectively be responsible for creating an annual web site to publicise their final year work.

Fields involved in delivery of this award :

Fields involved with the Faculty of Computing, Engineering and Mathematical Sciences :

Mechanical, Manufacturing and Aerospace Engineering : UEP Modules
Electrical and Computer Engineering : UEE Modules
Information Systems : UQI Modules

The award will also include modules drawn from fields external to CEMS :

Bristol Business School : UMM Module

Award Modules

Note: These are indicative and subject to change

BSc (Hons) Creative Product Design : The table below defines the modules required for this award.

Module No.	Title	Credit	New / Existing
UEP068C1	Design, Materials and Processes	30	N
UEP061C1	Engineering Design	30	E
UEE080S1	Engineering Principles A	20	E
UEP069D1	Visual Culture & Design Studies Realisation	40	N
UEP065S2	CAD/AM Applications	20	E
UQI142S2	Creativity & Design	20	N
UEP070S2	Mechatronics	20	N
UQI141S3	Multimedia Technology	20	E
UEP071D2	Applied Product Design Principles	40	N
UEP072S3	Advanced CAD Applications	20	N
UMM005S2	Managing a Small Business *	20	E
UEP073S3	Industrial Design Studies	20	N
UEP074T3	Individual Project (CPD)	60	N

Note : Module UMM005S2 Managing a Small Business is currently being reviewed along with a related module by BBS and it is to be replaced by an updated module covering similar issues during the 2001/2002 session and it is anticipated that the new module will serve as a suitable replacement for the current module.

The structure of the BSc (Hons) / BSc Sandwich Award is as shown below.
Note: This structure is indicative and subject to change

Module No.	Title	Credit	New / Existing
UEP068C1	Design, Materials and Processes	30	N
UEP061C1	Engineering Design	30	E
UEE080S1	Engineering Principles A	20	E
UEP069D1	Visual Culture & Design Studies Realisation	40	N
UEP065S2	CAD/AM Applications	20	E
UQI142S2	Creativity & Design	20	N
UEP070S2	Mechatronics	20	N
UQI141S3	Multimedia Technology	20	E
UEP071D2	Applied Product Design Principles	40	N
Placement Year : Module UEP099S3			
UEP072S3	Advanced CAD Applications	20	N
UMM005S2	Managing a Small Business	20	E
UEP073S3	Industrial Design Studies	20	N
UEP074T3	Individual Project (CPD)	60	N

Section 3 : Structure Diagram :

Note: this structure is indicative and subject to change

The following figure shows the modules to be taken at each level of study and the credit rating of each module. There are no options scheduled for the award in this initial version and thus all modules can be considered as core to the award.

Credit	10	20	30	40	50	60	70	80	90	100	110	120

LEVEL 1	Design, Materials and Processes UEP068C1 30 Credit New Module	Engineering Design UEP061C1 30 Credit Existing Module	Engineering Principles A UEE080S1 20 Credit Existing Module	Design Realisation & Introduction to Visual Culture UEP069D1 40 Credit Existing Module	

LEVEL 2	CAD / CAM Applications UEP065S2 20 Credit Existing Module	Creativity & Design UQI142S2 20 Credits New Module	Multimedia Technology UQII141S3 20 Credit Existing Module	Mechatronics UEP070S2 20 Credit New Module	Applied Product Design Principles UEP071D2 40 Credit New Module

LEVEL 3	Advanced CAD Applications UEP072S3 20 Credit New Module	BBS Small Business Module UMM005S2 20 Credit Existing Module	Industrial Design Studies UEP073S3 20 Credit New Module	Individual Project UEP074T3 60 Credit New Module

PLEASE NOTE: REFER TO THE FACULTY ON-LINE INFORMATION SYSTEM FOR UP-TO-DATE STRUCTURE INFORMATION
http://www.cems.uwe.ac.uk/exist/index.xql

Section 4 : Educational Aims :

What is meant by Creative Product Design ? :

Creative : The historical approach to design within the Faculty places emphasis on functional design and design evaluation issues, such as performance evaluation, stress analysis and geometric modelling. Less emphasis is placed on the creative processes involved in the investigation and formulation of the raw ideas that are used to shape a solution. Certainly, the aesthetic aspects of design realisation are beyond the scope of current engineering awards. In the world of consumer, high volume, high technology and rapidly changing products few artefacts will sell primarily on the basis of its function. Other issues, such as appearance, ease of use, aesthetic appeal and styling are significant factors influencing consumer choices. The overall aim of this award is develop students through extensive use of practical, hands-on design and build projects and case studies. Nearly a half of the credits is devoted to this type of activity.

Product : Something that does something useful. This may not just be a 3D object, such as a piece of furniture. Products in the 21st century include these types of objects but also include electronic products, electro-mechanical products and software based products. Success in the marketplace comes though not just with a good product in terms of function or appearance, a key issue is the ease with which the product can be manufactured and realised at a competitive cost.

Design : Effective design draw upon a range of tools and techniques by which a range of user/customer requirements are captured, collated, quantified and then used to evaluate a range possible solutions. Design is also the process by which the ideas developed are communicated to potential users / purchasers / manufacturers through a range of media : both IT based and in more tangible forms.

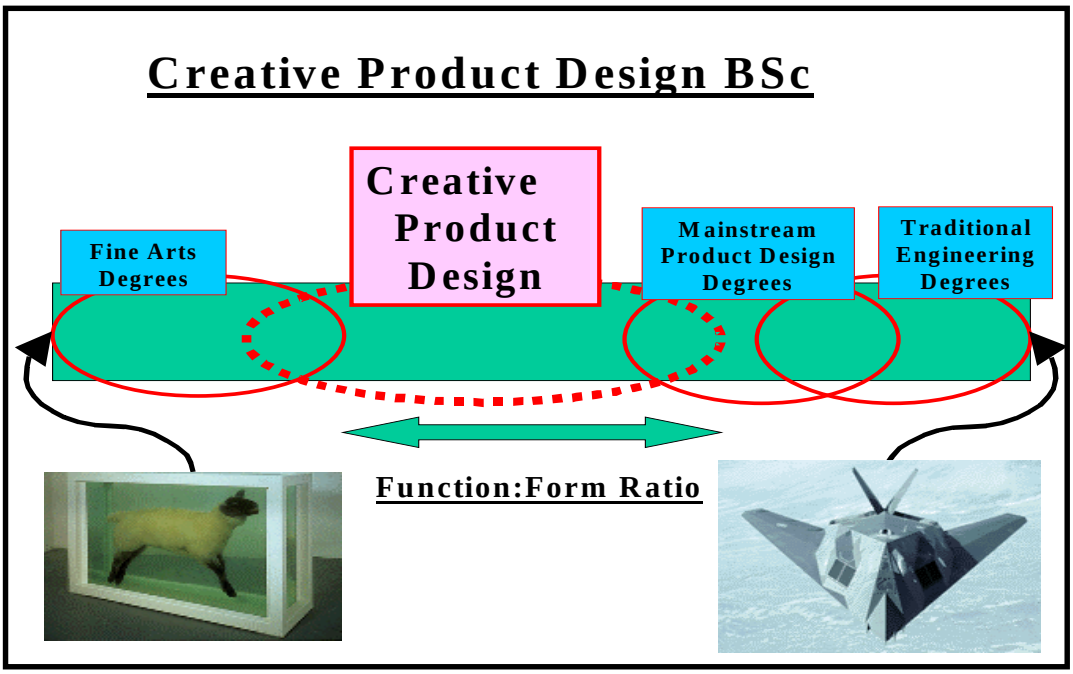

Figure 1 : Form Function Continuum

This award aims to link these three treads together to create an award that attempts to bridge the divide often found between conventional Art School "Design " awards

and traditional Engineering "Design" awards. UWE is well placed to offer such an award. The expertise of three faculties (CEMS, AMD and BBS) has been exploited in the design and development of this award. The CEMS faculty encompasses a wide variety of academic activity including such areas as music, environmental studies and user interface design. Staff In AMD have had extensive involvement in the development and design of this award and several staff at AMD will contribute to the delivery of the award.

Figure 1 graphically illustrates a continuum of design ranging from the Fine Art on the left to pure Engineering on the right based upon the notion of a Form / Function Ratio. Both ends of the spectrum are concerned with Creative Design, but with markedly differing emphasis. In the case of Fine Art the form is the expression of an idea, in the case of Engineering, as depicted in the figure, the focus is on the function and the form is defined to meet the requirements of the function. This award sits part way along the continuum and aims to deliver an integration of the two domains that marries the creative, expressionist dimension, the what, with the functional, pragmatic engineering, the how.

Creative design is the vision that creates items that can influence people to purchase them. Even though he or she does not or may not even need it, he/she must have it. This idea is the foundation of consumer society and is what makes and forms today's competitive industries and market places. Cars or, simpler than that, the common bicycle are good examples. The way they recently have evolved is one example of such creative thinking. To win the public, extra gadgets (additional extras) are creatively designed to appeal and make that winning difference in selling the car / or not selling at all. This requires knowledge and imagination plus the facility to make an ideas or dreams to take shape or to come true. This can lead to creating artefacts, some which could be patented, designed to attract those buyers who are no longer satisfied with what they have or would like to keep up with latest trends or fashion. Achieving these goals requires a mix of creativity in developing the product ideas and concept, allied to practical and technical skills relating to the communication, realisation and manufacture of the product.

This award aims to equip students with a mix of knowledge and skills in the creative domain allied to a complementary set of technical competencies and knowledge within an integrated engineering context. Hence the course includes a very high proportion of "design and produce" case studies where students will be able to express themselves creatively and then be able to assess the cost, performance and reliability and aesthetic aspects of a design solution. The award is designed for people who do not necessarily have a science or analytical background but who have a strong motivation for a career in design.

Design in the 21st Century, in any context, field or domain is a multi-disciplinary team based activity. This award proposes to equip students with the skills and techniques commonly used in business and industry to co-ordinate and control multi-partner, multi-disciplinary team based working. Thus the award will address key to this : the Processes of design - in combination with Design Approaches and creativity techniques, which will be delivered through experiential action-learning based teamwork and group process based, using reflective practice approaches such as Schön and Cowan.

Industrial Perspective : Companies are now designing products using multidisciplinary teams of experts from a variety of key disciplines. In this context it is becoming increasingly important to have a broad awareness of technologies and

processes so that the design possibilities and constraints can be identified as the concept emerges. This award will produce graduates with the necessary knowledge, skills and competencies to address the broad design process as well as sufficient detailed knowledge of materials and manufacturing processes to enable the graduates to contribute to and lead product design teams.

It also becoming apparent that modern designers must now be skilled in being able to locate, interpret, and evaluate information. Electronic data is fast becoming an important source of design information and this course aims to show students how to search for and make best use of this and other sources of information in a rigorous manner. This knowledge and skills will be developed through an integrated set of design projects allied to specific lectures and tutorials. This approach of marrying directed learning with more open ended problem based learning is repeated in several areas of the award and has been designed into the award to prepare students for the rapidly evolving and changing sector they will be working in.

Most industrial designs are modular. They typically consist of OEM (Original Equipment Manufacturer) components such as electronic devices, power supplies, hydraulic systems, pneumatic systems, optical equipment etc. Similarly, materials are supplied by specialist companies from a standard range. A key design skill in this context is the ability to interpret and comprehend the key characteristics of the various materials, modules and sub-systems that comprise a design solution. A good designer must have an extremely broad awareness of materials, technology and processes.

The following key points summarise the overall objectives and aims of the new award :

- To provide a coherent programme of studies for applicants who wish to pursue a career in product design.
- To establish a strong reputation for producing graduates of high calibre.
- To establish strong working partnerships with product design organisations in the region.
- To stimulate innovation and support students who wish to pursue a business idea through product design.
- To attract a significant proportion of mature students who wish to pursue a career change or have a product design idea they wish to develop.
- To establish and maintain a dedicated, passionate, self-motivated, student ethos.

Section 5 : Learning Outcomes :

Knowledge and Understanding:

On completion of the award students would be expected to be able to demonstrate knowledge and understanding of the following topics:

K1 The nature of creative design and the creative design process.
K2 The developmental stages of design in an industrial / business environment.
K3 Methods and strategies for the generation and evaluation of alternative design solutions.
K4 Methods for the representation of design solutions, using a range of media and methods covering 2D and 3D representations and realisations.

K5 Materials and associated manufacturing processes / technologies.
K6 The contribution and capabilities of IT and computer based systems for design development and realisation.
K7 Project Management and Business practices and techniques.
K8 Understanding of Business and Marketing issues in the context of Product Design

Intellectual Skills :

On completion of the award students would be expected to have acquired the following intellectual skills:

I1 The ability to select , apply and develop appropriate tools and methods for modelling and analysis of design problems.
I2 The ability to select , apply and develop appropriate approaches to stimulate creativity.
I3 The ability to use a range of approaches to assess/evaluate proposed solutions objectively.
I4 The ability to undertake research using a range of information sources to extract and present key issues relevant to the research topic.
I5 The ability to present solutions and articulate rationales for the solutions proposed.

Subject / Practical Skills :

On completion of the award students would be expected to be able to apply the following subject and practical skills:

S1 The ability to translate user requirements into a formal design brief.
S2 Studio work covering a range of skills allied to an understanding of materials and processes to enable the production of prototype solutions.
S3 IT skills covering a range of systems for design representation and realisation.
S4 Practical testing and evaluation of prototypes to verify conformance to design requirements.
S5 The ability to search for information and develop ideas and solutions using information gained.
S6 Management of multi-disciplinary projects.

Transferable / Key Skills :

On completion of the award students would be expected to have acquired the following transferable / key skills :

T1 The use of creativity and innovative ideas in the development of solutions.
T2 Effective communication of solutions using a range of media, in a range of forums.
T3 The use of information technology skills.
T4 Responsibility for continuing professional development.
T5 Teamwork: both as a team player and as team manager / co-ordinator.
T6 Time and resource management skills.

Section 6 : Teaching, Learning and Assessment Methods

A key element of the teaching and learning strategy of this award is that students learn by problem based learning that is managed through a series of projects each addressing relevant design issues through the three level of studys of the award. These design projects are used to introduce a range of specific issues and provide an integrating mechanism for the other taught elements of the award. These project-based activities will be supported by underpinning lectures and tutorials in which broad contextual or specific tools and techniques will be introduced. The students will then use the project-based activities, which will be both individual and group based, to apply and integrate the topics introduced in the formal teaching activities.

The Faculty of Engineering has long and well proven track record of collaborating with a range of industrial partners to create stimulating and highly relevant teaching case studies / design projects. This tradition will be continued with this award and in the early stages of the award several of the tasks set for the group design projects will be based upon real industrial and commercial projects. This industrial focus culminates in a module at level three which is wholly based upon a current industrial / commercial problem. This emphasis on developing students business as well as creative skills and competencies builds upon the Faculty's tradition of producing graduates who are effective practitioners able to marry theoretical thinking with the practical skills which enable them to design and deliver a commercially viable solution.

In order to facilitate the development of these skills the award has apportioned considerable time to project based activities through the whole award. In level one the students will tackle a number of tightly focused projects each aimed at addressing a specific set of issues and each assessed in a range of ways to expose students to a breadth of design issues, both practical and theoretical. At level two the number of exercises reduces and students are required to participate in the definition and scoping of the tasks set. At level three in the individual project the student negotiates the theme, approach and deliverables for the project with a member of the award team, and as part of the submission has to reflect on their execution of the project. In this structured manner graduates of this award will be equipped with an appropriate mix of knowledge/understanding, intellectual skills, practical skills and transferable key skills.

The first of the following two tables shows the distribution of skills and knowledge acquisition across the award. The second indicates the teaching and learning approach and assessment strategies across the award.

		Subject Knowledge, and Practical Skills	Creative thinking Practice	Materials knowledge	Knowledge of processes	Electronics Technology	Sensor Technology	Actuator Technology	Mechanism Design	Design analysis tools	Surface and solid geometry	Formal design methods	Presentation skills	Teamworking skills	Fabrication/craft skills	Awareness of IPR issues	Multimedia Practice	Project management skills	Marketing awareness & tools	Software design skills	Sustainable design issues	Product evaluation Techniques	Quality assurance methods	Market research and questionnaire design	Cost analysis and accounting	Requirements analysis	Design Ethnography	History of technology	Ergonomics
Credits	**Level**	**Module Title**																											
30	1	Design Materials and Processes		X	X																X	X						X	
30	1	Engineering Design	X	X	X				X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
20	1	Engineering Principles				X	X	X																				X	
40	1	Visual Culture and Design Studies Realisation	X	X	X	X			X			X	X	X	X	X	X	X	X		X	X		X	X	X			X
20	2	CAD/CAM Applications		X	X				X	X	X																		
20	2	Creativity and Design	X							X		X	X	X			X					X	X			X	X	X	X
20	2	Mechatronics				X	X	X																					X
20	3	Multimedia Technology	X														X			X									
40	2	Applied Product Design Principles	X	X	X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
20	3	Advanced CAD Applications		X	X					X	X									X									
20	2	Managing a small business														X			X				X		X				
20	3	Industrial Design Studies	X	X	X								X	X		X		X	X					X	X	X	X		
40	3	Individual Design Project	X	X	X								X		X	X		X	X					X	X	X	X		

		Teaching & Learning / Assessment Methods	Formal Lectures	Subject Tutorials	Studio / Workshop	Computer Laboratories	Group Work	Design Studies	Design Projects	Self Directed Study	Artifact Production	Design Portfolio	Poster Display	Oral Presentation	Studio / Workshop Logbooks	Written Assignments	Computer Based Assignments	Formal Examinations/Tests
Credits	**Level**	**Module Title**																
30	1	Design Materials and Processes	X	X					X	X		X				X		X
30	1	Engineering Design	X				X		X	X			X	X		X		
20	1	Engineering Principles	X	X		X				X								X
40	1	Visual Culture and Design Studies Realisation			X		X	X	X		X	X		X	X			
20	2	CAD/CAM Applications	X	X		X											X	X
20	2	Creativity & Design			X		X	X	X	X	X	X		X	X			
20	2	Mechatronics	X	X		X	X			X				X	X			X
20	3	Multimedia Technology	X	X		X				X					X		X	X
40	2	Applied Product Design Principles				X	X	X			X	X		X	X			
20	3	Advanced CAD Applications	X	X		X										X	X	X
20	2	Managing a small business	X	X												X		X
20	3	Industrial Design Studies			X		X		X	X	X	X		X	X			
40	3	Individual Design Project						X		X	X	X		X	X	X		

Section 7 : Reference points used to develop award :

The impetus for the development of this award has come from a number of sources, both within the Faculty / University and from sources external to the University. As with many new awards the genesis of the award is a combination of staff interest / enthusiasm allied to factors reflecting the wider and strategic policies of the University.

Subject Interest : Arising from several small scale activities : student projects and research projects there is a body of staff within the Faculty who have an interest and expertise in the creative aspects of design and have sought ways to integrate these topics into their existing awards and teaching. Due to the tight constraints imposed by the Engineering based professional bodies there is limited scope to incorporate many of the ideas and objectives outlined for this award within existing frameworks. Thus staff have sought a vehicle by which these interests can be integrated along with relevant traditional engineering topics.

University Strategy and Mission Statement : The recent Vision and Mission produced by the Directorate defines a number of strategic objectives for the University in the coming five years. In the context of this award there are several objectives that are of specific relevance. These are attracting higher points scoring applicants, reducing dependency on clearing and establishing a national reputation. The proposed award has potential to attract high calibre students, from disciplines currently not accessible to us, into an award that exploits the unique mix of skills and resources available in AMD and CEMS to create an award that is not offered by any of main regional competitors.

Faculty Strategy and Mission Statement:

This new award is strongly in line with both the vision and mission of the new merged faculty. Those areas where there is particular resonance are underlined below:

Vision

To Invent the Future by:

- defining a new vision for education in Computing, Engineering and Mathematical Sciences
- becoming a showcase for emerging technology
- developing novel ways of using technology
- demonstrating excellence in research linked to excellence in teaching and learning
- enabling new models of partnership with industry and the community.

Mission

1) We aim to define a new vision for Education in Computing, Engineering and Mathematical Sciences by:

- redefining subject boundaries and creating new holistic and multidisciplinary approaches
- being effective in enquiry, teaching and learning, embracing new methods of delivering knowledge supporting learning
- providing opportunities for students of all ages and background to develop their full potential through courses of study educational experiences that are challenging and stimulating.

2) We aim to become a showcase for emerging technology by:

- creating a world-class infrastructure for teaching and research based upon technology demonstrators that represent or define the state of the art
- the proactive dissemination of both research and innovative teaching approaches beyond conventional academic fora.

3) We aim to develop novel ways of using technology by:

- understanding the relationship between social and human need and the capabilities of technology
- applying technology in novel fields and contexts.

4) We aim to demonstrate excellence in research linked to excellence in teaching by:

- nurturing an inclusive learning environment which actively fosters and supports groups and individuals to undertake research
- creating an environment which values all employees and encourages and supports them in the development of their careers to meet their aspirations
- encouraging the application of multiple perspectives and knowledge sources for the exploration of new and emerging synergies in research and education.

5) We aim to enable new models of partnership with industry and the community by:

- developing multifaceted frameworks for working with industry
- active participation and leadership within civic, regional, and international fora
- providing an inclusive environment that encourages the participation of the wider community in the life of the faculty

Benchmark Statements : Two benchmark statements were consulted in the preparation of the BSc Creative Product Design: the Engineering statement, published in 2000, and the draft Art and Design statement, made available for public scrutiny in 2001. All references in the following explanation are to numbered sections in the benchmark statements.

A. Engineering

The BSc Creative Product Design award fits the definition of Engineering given in the benchmark statement in that its focus is on enabling graduates to apply knowledge and ability to the production of artefacts: “The outcome of Engineering is a product, or perhaps a process or service; it is this that distinguishes it from Science (which is about observing and explaining natural phenomena) and Mathematics (which is about describing and exploring relationships).” (1.2) The modules on Engineering Principles, on Materials and on hard and soft products will allow students to acquire essential knowledge. They will be complemented by the Design Studies and project modules so that students can demonstrate their ability to apply knowledge in the production of artefacts.

The benchmark statement contains an holistic definition of Engineering, as a profession shaped by a context of economic and social constraints (1.2). This will be evident in the award, with the attention paid to visual culture, to the business context and the need to maintain relationships with industrial clients.

Knowledge and Understanding

The benchmark statement emphasises that “each specialist discipline has a different knowledge base” (2). In this award the principal knowledge base is of materials and principles that overlap with other engineering disciplines combined with an awareness of visual culture and the way in which design is received by clients and the public. As explained above, students will be expected to integrate knowledge gained from modules in these subjects in their practical work in the Design Studies and Project modules. The depth of their understanding of that knowledge should consequently be strengthened.

Intellectual Abilities

The principal intellectual abilities identified in the benchmark statement will be supported through the combination of content-driven and practical modules. In particular, the Design Studies and Project modules will give students experience of "solv(ing) engineering problems, often on the basis of limited and possibly contradictory information", "design(ing) a system, component or process to meet a need" and "evaluat(ing) designs, processes and products" (2). The aim of the award, in addressing engineering, aesthetic and business issues, meets the requirement in the benchmark statement for graduates to be able to "take an holistic approach, applying professional judgements, balancing costs, benefits, safety, quality, reliability, appearance and environmental impact" (2).

Practical Skills

The practical skills laid out in the benchmark statement are similarly represented in the award. The capacity to "use a wide range of tools, techniques and equipment, including pertinent software" (2) will be generated through modules on Engineering Principles, Materials and CAD/CAM. Experience of work in laboratory conditions will be provided through work on design projects in dedicated rooms and in relevant laboratories for engineering and software which will be shared with other awards in the faculty.

General Transferable Skills

The benchmark statement identifies a variety of transferable skills which will be supported by this award. The Design Studies and Project modules will be particularly important in developing skills of communication, resource and time management, team working and, through the use of reflective logs, laying the foundation for awareness of one's personal development. (2)

Content of Degree Programmes

Indicative content for Engineering degree programmes is laid out in section 3 of the benchmark statement. The relevant items of recommended content for this award are:

Design - creativity and innovation: although the benchmark statement argues that "it may be difficult to teach creativity itself", techniques for developing innovative thinking and novel agendas will be developed in the level 2 module on creativity and design. Creativity itself is part of the rationale for the entire award, and so will form part of the criteria for assessment in the project modules, with attention paid both to the end product and to the process of how the ideas on which it is based have been generated.

Business Context: the awareness of the need for innovative products to be financially viable and acceptable to the wider public will form an important part of the award at all levels. The input from other faculties (Art, Media and Design and the Bristol Business School) will be particularly helpful in this regard. The level 3 industrial project will also require students to be aware of the problems of negotiating with commercial clients.

Engineering Practice: a foundation of modules on Materials and Engineering Principles, shared with other Engineering awards, will be built on through the award. This will ensure that, whatever type of products students specialise in, the end results are properly constructed and documented.

Teamwork: the experience of working with fellow students will be stimulated through the modules which require team working, notably the Design Studies, Creativity and Design and the Industrial Project modules. Students will be required not just to produce an end product but also to reflect on the way in which their ability to work with others has been developed through the experience.

Integration of knowledge and understanding: the benchmark statement identifies project modules as the prime method of integrating course content and practice on Engineering awards. On BSc Creative Product Design, students will be prepared for practical project work from level 1, through the Design Studies module. Students will experience a learning curve about creative design practice which involves diminishing amounts of tutor supervision and assignment specification. Graduates will have reached the point at which they are able to use their own initiative to produce substantial pieces of work which meet the needs of an specified client and develop their own solutions to design problems which they themselves have identified.

B. Art and Design

The Art and Design benchmark statement is the principal source of ideas about the place of creativity, its component knowledge base and its assessment in a curriculum such as that of the BSc Creative Product Design. It has a focus on the need to "prepare students for professional, creative practice" (preface) which is shared by the developers of this award.

General approach

The benchmark statement declares that "Typically, programmes in art & design emphasise imagination, creativity and, where appropriate, craft skills, and are designed to develop students' intellectual powers and their ability to communicate." (1.6) This combination is reflected in the award in modules on the practice of design, the nature and act of creativity and a solid base of knowledge about the materials from which products can be made and the way in which users are likely to perceive them.

The benchmark statement argues for the important economic role played by graduates in the discipline: "Graduates in art & design disciplines have demonstrated that they are equipped with the appropriate skills and abilities to operate effectively in the marketplace. In particular, they display resourcefulness, entrepreneurial skills, and the capacity to establish new and innovative enterprises." (1.9) This award is similarly intended to develop the ability of graduates to apply their creativity to marketable and usable solutions. The final year industrial project requires some contact with the constraints placed on design by a client and his/her available resources. Similarly, the small business module is aimed particularly encouraging awareness of the type of business in which creative designers typically work: consultancies or self-employment.

Teaching and Learning

"Active learning through project-based enquiry has always been a feature of the art & design curriculum in higher education. Through this approach students have been encouraged to develop both the capacity for independent learning and the ability to work with others." (2.5) Practical project work is an essential component of the award at each level of study. It gives students the opportunity to integrate the knowledge they have gained and demonstrate their ability to implement and test their own designs and collaborate with fellow students. The Design Studies modules at levels 1 and 2 will provide foundational experience of practical work in a team setting, thus providing a learning curve to underpin the level 3 individual and industrial project modules. Other modules on the award focus on particular types of product, but also have the development of active learning through practical work: e.g. Multimedia Systems.

" An appropriate range of well-equipped studios and workshops is necessary to provide a challenging and professional learning environment which usefully mirrors the context of professional practice." (5.1.2) The award development team envisages the creation of a workshop suitable for students to use for experimentation with materials, designs and prototypes of mechanical and mechatronic artefacts. The faculty already has the facilities necessary for the development of electronic products (used on the MEng Electronic Engineering). It also has a Multimedia Laboratory (used by a variety of Computing and Engineering awards), equipped with the type of software which permits the insertion of sound and moving images into "soft" products.

With respect to subject-specific knowledge and understanding, attributes and skills outlined in the benchmark statement the BSc Creative Product Design modules have been placed in the award which will

introduce and encourage the use of techniques and methodologies for creative thinking

develop students' familiarity with the materials from which different types of products are made and require students to demonstrate that they "have made connections between intention, process, outcome, context, and methods of dissemination." (6.3)

enhance students understanding of the nature of visual culture and how it interacts with the process of design.

Successful completion of the Design Studies and level 3 project modules will indicate that the student has developed abilities in self-management, collaboration and the ability to communicate and negotiate with clients and audiences. These are the most relevant examples of generic attributes and skills noted in the benchmark statement (6.4).

The scope of the subject

The benchmark statement notes that it is increasingly common for design education to cross the boundaries between disciplines (3.1). This is very much the case for this award. As noted elsewhere in this document, it draws modules from Engineering, Information Systems and Business as well as Art and Design.

Increasingly, too, design education covers a range of outputs: "a broad spectrum of two-dimensional, three-dimensional and time-based media, materials and processes." (3.10) This award complements that wide ranging vision by requiring students to engage with mechanical, mechatronic and "soft" products before choosing the area in which they wish to specialise.

The benchmark statement also emphasises the holistic nature of good design education: "Design covers all aspects of decision making in relation to the aesthetic, operational, user, market, production and/or manufacturing characteristics of artefacts and systems." (3.11) In the same spirit, this award requires students to engage with aesthetic, financial, organisational and engineering concerns.