Plymouth University

Faculty of Arts and Humanities
School of Architecture, Design and Environment

Programme Specification

MSc High Performance Buildings

Definitive Document Approved 21st May 2015
Date of Implementation Sep 2016
1. **MSc High Performance Buildings**

<table>
<thead>
<tr>
<th>Final award title</th>
<th>MSc High Performance Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate award title(s)</td>
<td>PG Diploma (on completion of 120 taught credits)</td>
</tr>
<tr>
<td>Intermediate award title(s)</td>
<td>PG Certificate (on completion of any 60 taught credits)</td>
</tr>
<tr>
<td>Awarding institution</td>
<td>University of Plymouth</td>
</tr>
<tr>
<td>Teaching institution</td>
<td>University of Plymouth</td>
</tr>
<tr>
<td>Accrediting body</td>
<td>Chartered Institution of Building Services Engineers (CIBSE), possibly Charted Institute of Architectural Technology (CIAT)</td>
</tr>
<tr>
<td>Appropriate benchmark(s)</td>
<td>The Quality Assurance Agency for Higher Education 2010, Master's degree characteristics</td>
</tr>
<tr>
<td>UCAS code</td>
<td>K290 (to be confirmed by University)</td>
</tr>
<tr>
<td>JACS code</td>
<td>K290</td>
</tr>
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</table>

**Summary of specific conditions/regulations**
- *not applicable*

**Date of first accreditation**
- *Fall 2017, after the programme has been running for one year*

This Programme Specification details how and where the skills and other outcomes are delivered in this programme.
2. Distinctive Features of the Programme and the Student Experience

This new MSc High Performance Buildings is developed in synergy with the redesign of the undergraduate programme of school of Architecture, Design and Environment as part of the Curriculum Enrichment Project (CEP), especially the provision of a BSc in Architectural Engineering.

It aims to develop a new ‘technology pathway’ in the School, that comprises of:
BSc Architectural Engineering ► MSc High Performance Buildings ► PhD in Building Performance Analysis. Both the MSc High Performance Buildings and the BSc Architectural Engineering are part of the School and Faculty Plan for 2014-15, as approved by the VCE.

The programme aims to capitalize on the research in the area of Building Performance Analysis, which is one of the strong research pillars of the School of Architecture, Design and Environment. Since 2005, this area has contributed in the order of £3m research funding to Plymouth University, and in the order of 150 mostly peer-reviewed publications; it was key to the School's first ever submission under 2014 to Unit of Assessment 16 (Architecture, Built Environment and Planning). The research expertise in building performance analysis includes areas such as building simulation and monitoring and verification which are currently not directly aligned with the teaching offer. At the same time industry is showing significant interest in these fields, especially in the context of the need to increase energy efficiency and reduce carbon emissions in the built environment, which leads to good career prospects for those who undertake further education in this area.

The subject of High Performance Buildings is not offered by any UK university, yet interest is evidenced by the industries Building Performance Awards as introduced in 2004 (see http://www.cibse.org/Building-Performance-Awards), dedicated publications in the area (http://www.hpbmagazine.org), and emergence of recent books such Design and Construction of High Performance Homes (Trubiano, 2013). Related aspects such as Energy Performance Contracting are currently experiencing rapid growth, with the market size of Energy Service Companies (ESCOs) in the UK estimated at € 400 million in 2010, with a potential to grow to € 1 billion, making this an excellent field to work in.

In the USA High Performance Buildings is offered by some Universities, but is often seen as the equivalent of 'green' or 'sustainable' buildings. In contrast, the Plymouth approach to High Performance Buildings will be a holistic one, that includes other
dimensions such as ‘workload capacity’ of the building, as well as socio-cultural and historic.

The course will cover both high-tech and low-tech buildings, new build and retrofit, and will look at performance from the point of view of different stakeholders throughout the building life cycle.

Other distinctive features of the programme include:

- **Professional Accreditation**: The course will be fully accredited by the leading professional body recognised for building services, the Chartered Institution of Building Services Engineers (CIBSE). Dual accreditation will be sought with the Charted Institute of Architectural Technology (CIAT).

- **Inspiring Teaching**: The programme is taught by staff with both an industry and research background. Teaching is also supported by industry professionals and an extensive programme of UK and international visiting speakers.

- **Site visits**: Off campus, students also enrich their learning with industry experience through site visits and international field trips.

- **Research-informed learning**: The academic staff are also researchers, allowing the latest research findings to be delivered directly to the students. The research covers a broad range of specialist areas, including: construction management, building performance analysis, thermography, construction economics, architecture, and urban design.

- **Industry Links**: The department sustains good links with many of the leading construction companies in the UK. Industry professionals play an active role in the programme, by participating in guest lectures, workshops and tutorials. These provide opportunities for workplacements to individual students and future employability opportunities.

- **Real assessments**: The course is designed to prepare students for their future career. The assessments reflect the varied world of work, a mixture of coursework, project work, site visit reports, examinations, and presentations. Students work on industry led group projects with real project briefs and clients, and they benefit from guidance from a panel of industrial advisers,
which help them to develop the professional skills and networking necessary to successfully progress in the sector.

3. Relevant QAA Subject Benchmark Group(s)
Master's degree characteristics 2010:

4. Programme Structure
The MSc Programme in High Performance Buildings will have a straightforward structure. It will have 7 modules, for a total of 180 credits; 6 modules will be 20 credit modules, yielding 120 credits in total, while the 7th module will be a research project module that will carry a weight of 60 credits.

Pass requirements for the modules are set at 50%.

See diagrams for overall structure. Detail of the content of these modules is provided on the table following the two diagrams.
The normal study mode will be full-time, where all 180 credits are taken in the same year. If demand is there we will consider a part-time mode, with 100 credits taken in year one and 80 credits taken in year two.

Diagram for part-time mode:
<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Credit</th>
<th>Semester</th>
<th>Status</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPB701</td>
<td>Introduction to High Performance Buildings</td>
<td>20</td>
<td>1</td>
<td>Core</td>
<td>Compensatable 50% EX 50% CW</td>
</tr>
<tr>
<td>HPB702</td>
<td>Emerging Construction Technology</td>
<td>20</td>
<td>1</td>
<td>Core</td>
<td>Compensatable 50% EX 50% CW</td>
</tr>
<tr>
<td>HPB703</td>
<td>Smart and Intelligent Buildings</td>
<td>20</td>
<td>1</td>
<td>Core</td>
<td>Compensatable 50% EX 25% CW, 25%P</td>
</tr>
<tr>
<td>HPB704</td>
<td>Advanced Building Performance Simulation</td>
<td>20</td>
<td>2</td>
<td>Core</td>
<td>Compensatable 50% EX 25% CW, 25%P</td>
</tr>
<tr>
<td>HPB705</td>
<td>Performance Finance and Investment</td>
<td>20</td>
<td>2</td>
<td>Core</td>
<td>Compensatable 50% EX 50% CW</td>
</tr>
<tr>
<td>HPB706</td>
<td>Performative Architecture</td>
<td>20</td>
<td>2</td>
<td>Core</td>
<td>Compensatable 100% CW</td>
</tr>
<tr>
<td>HPB707</td>
<td>High Performance Buildings Research Project</td>
<td>60</td>
<td>1 &amp; 2</td>
<td>Core</td>
<td>Compensatable 100% CW</td>
</tr>
</tbody>
</table>

5. Programme Aims

The MSc High Performance Buildings is a one-year full time-time programme focussed on building performance. The programme aims to provide students with an opportunity to develop proficiency in the quantification of building performance, and the application of the performance concept throughout the building life cycle.

The programme opens up a new 'technology pathway' route in the School of Architecture, Design and Environment that comprises of a new BSc in Architectural Engineering, the MSc High Performance Buildings, and research degrees in Building Performance Analysis.

Graduates who have completed this programme will have:

- A critical understanding of building performance and the various approaches to measure and quantify this performance;
- Comprehensive knowledge of existing and novel technologies, fabrication and construction methods for buildings.
- Knowledge and understanding of the financial and economic drivers that govern the life cycle of high performance buildings.
- Ability to develop and assess complex building performance indicators.
- Intellectual skills to critically analyse building performance in terms of building requirements, functions and behaviour.
- Ability to analyse data in complex situations, dealing with, amongst others, incomplete or contradictory information.
• Intellectual skills to reflect on building performance in the technical context, but also from a socio-economic, aesthetic or cultural perspective.
• Ability to use building performance simulation tools, and to collect data from existing buildings through monitoring and verification, and post occupancy evaluation.
• Skills to carry out optimization, fault detection and control of building systems.
• Ability to deal with stakeholders involved in building performance.

6. Programme Intended Learning Outcomes

6.1. Knowledge and understanding

On successful completion graduates should have developed:

1) A critical understanding of building performance and the various approaches to measure and quantify this performance.

2) Comprehensive knowledge of existing and novel technologies, fabrication and construction methods for buildings.

3) Knowledge and understanding of the financial and economic drivers that govern the life cycle of high performance buildings.

6.2. Cognitive and intellectual skills

On successful completion graduates should have developed:

1) Ability to develop and assess complex building performance indicators.

2) Intellectual skills to critically analyse building performance in terms of building requirements, functions and behaviour.

3) Ability to analyse data in complex situations, dealing with, amongst others, incomplete or contradictory information.

4) Intellectual skills to reflect on building performance in the technical context, but also from a socio-economic, aesthetic or cultural perspective.
6.3.  Key and transferable skills
On successful completion graduates should have developed the ability to:

1) Identify individual learning needs and understand the personal responsibility required for further professional education.

2) Apply problem solving skills, professional judgement, and initiative to make appropriate decisions in complex and unpredictable circumstances.

3) Plan, conduct and communicate a detailed programme of research.

6.4.  Employment related skills
On successful completion graduates should have developed:

1) Initiative and personal responsibility.

2) Effective communication and collaboration skills.

3) The ability to make decisions made on incomplete information.

4) Career awareness and personal development planning.

6.5.  Practical skills
On successful completion graduates should have developed:

1) Ability to use building performance simulation tools, and to collect data from existing buildings through monitoring and verification, and post occupancy evaluation.

2) Skills to carry out optimization, fault detection and control of building systems.

3) Ability to deal with stakeholders involved in building performance.
7. **Admissions Criteria, including APCL, APEL and DAS arrangements**

The admissions policy and procedures are in place to ensure that applicants have the intellectual ability, motivation and, where appropriate, the professional experience to benefit from, and contribute to, the MSc High Performance Buildings.

The normal minimum qualification is an Upper second-class Bachelor's degree (2.1) from a UK university in engineering, science, mathematics, or a discipline related to building. Other qualifications supplemented with relevant industrial experience will also be considered.

International students require a suitable academic profile as well as an English language score of IELTS 6.5 or equivalent.

8. **Progression criteria for Final and Intermediate Awards**

Students undertaking the MSc High Performance Buildings must achieve a pass (50%) in all modules. There is no compensation for failed modules.

Where a student has achieved an aggregate of 70%, they will be awarded MSc High Performance Buildings with Distinction.

Where a student has achieved an aggregate of 60%, they will be awarded MSc High Performance Buildings with Merit.

Where a student has passed 120 credits of the programme they will be awarded a Postgraduate Diploma.

Where a student has passed 60 credits of the programme they will be awarded Postgraduate Certificate.

9. **Exceptions to Regulations**

Not applicable.

10. **Transitional Arrangements**

Not applicable.

11. **Mapping and Appendices:**
<table>
<thead>
<tr>
<th>MSc HPB ILO #</th>
<th>Programme Intended Learning Outcomes</th>
<th>Module in which LO is assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.1.</td>
<td>A critical understanding of building performance and the various approaches to measure and quantify this performance.</td>
<td>HPB701 HPB703 HPB706 HPB707</td>
</tr>
<tr>
<td>6.1.2.</td>
<td>Comprehensive knowledge of existing and novel technologies, fabrication and construction methods for buildings.</td>
<td>HPB701 HPB702</td>
</tr>
<tr>
<td>6.1.3.</td>
<td>Knowledge and understanding of the financial and economic drivers that govern the life cycle of high performance buildings.</td>
<td>HPB705</td>
</tr>
<tr>
<td>6.2.1.</td>
<td>Ability to develop and assess complex building performance indicators.</td>
<td>HPB701 HPB703 HPB704 HPB707</td>
</tr>
<tr>
<td>6.2.2.</td>
<td>Intellectual skills to critically analyse building performance in terms of building requirements, functions and behaviour.</td>
<td>HPB701</td>
</tr>
<tr>
<td>6.2.3.</td>
<td>Ability to analyse data in complex situations, dealing with, amongst others, incomplete or contradictory information.</td>
<td>HPB701 HPB703 HPB704 HPB706 HPB707</td>
</tr>
<tr>
<td>6.2.4.</td>
<td>Intellectual skills to reflect on building performance in the technical context, but also from a socio-economic, aesthetic or cultural perspective.</td>
<td>HPB701 HPB706</td>
</tr>
<tr>
<td>6.3.1.</td>
<td>Identify individual learning needs and understand the personal responsibility required for further professional education.</td>
<td>HPB701 HPB706</td>
</tr>
<tr>
<td>6.3.2.</td>
<td>Apply problem solving skills, professional judgement, and initiative to make appropriate decisions in complex and unpredictable circumstances.</td>
<td>HPB701 HPB702 HPB703 HPB704 HPB705 HPB706 HPB707</td>
</tr>
<tr>
<td>6.3.3.</td>
<td>Plan, conduct and communicate a detailed programme of research.</td>
<td>HPB707</td>
</tr>
<tr>
<td>6.4.1.</td>
<td>Initiative and personal responsibility.</td>
<td>HPB701 HPB702 HPB703 HPB704 HPB705 HPB706 HPB707</td>
</tr>
<tr>
<td>6.4.2.</td>
<td>Effective communication and collaboration skills.</td>
<td>HPB701 HPB702 HPB703 HPB704 HPB705 HPB706</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Relevant Courses</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>------------------</td>
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<tr>
<td>6.4.3.</td>
<td>The ability to make decisions made on incomplete information.</td>
<td>HPB701, HPB702, HPB703</td>
</tr>
<tr>
<td>6.4.4.</td>
<td>Career awareness and personal development planning.</td>
<td>HPB701, HPB702, HPB703, HPB704, HPB705, HPB706, HPB707</td>
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<tr>
<td>6.5.1.</td>
<td>Ability to use building performance simulation tools, and to collect data from existing buildings through monitoring and verification, and post occupancy evaluation.</td>
<td>HPB703, HPB704</td>
</tr>
<tr>
<td>6.5.2.</td>
<td>Skills to carry out optimization, fault detection and control of building systems.</td>
<td>HPB703, HPB704</td>
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<tr>
<td>6.5.3.</td>
<td>Ability to deal with stakeholders involved in building performance.</td>
<td>HPB701, HPB702, HPB703, HPB704, HPB705, HPB706, HPB707</td>
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</table>

**Appendices**

*Not applicable*