

MA Virtual and Augmented Reality (3D Graphics and User Experience); MSc Virtual and Augmented Reality (Programming and Computer Science)

Programme Specification

Awarding Institution:

University of London (Interim Exit Awards made by Goldsmiths' College)

Teaching Institution: Goldsmiths, University of London

Name of Final Award and Programme Title:

MA Virtual and Augmented Reality (3D Graphics and User Experience)

MSc Virtual and Augmented Reality (Programming and Computer Science)

Name of Interim Exit Award(s):

Postgraduate Certificate in Virtual and Augmented Reality (3D Graphics and User Experience)

Postgraduate Certificate in Virtual and Augmented Reality (Programming and Computer Science)

Postgraduate Diploma in Virtual and Augmented Reality (3D Graphics and User Experience)

Postgraduate Diploma in Virtual and Augmented Reality (Programming and Computer Science)

Duration of Programme: 1 year full-time or 2-3 years part-time

UCAS Code(s): Not applicable

HECoS Code(s): (100363) Computer Animation and Visual Effects

QAA Benchmark Group: Computing

FHEQ Level of Award: Level 7

Programme accredited by: Not applicable

Date Programme Specification last updated/approved: September 2019

Home Department: Computing

Department(s) which will also be involved in teaching part of the programme:

Not applicable

Programme overview

Immersive experiences, including Virtual and Augmented Reality are the most exciting new medium to emerge in the 21st century. Virtual Reality (VR) is a medium unlike any other, it

completely immerses you in a new world that can feel as real as the physical world around you. No other medium can create an experience like it, and most people who have tried it will know that it is the medium of the future.

Augmented Reality (AR) integrates these kind of immersive 3D environments with the real world allowing our real world interactions to be enhanced with digital content. Together VR and AR are parts of a continuum of experience, Mixed Reality (or MR), that combines real and virtual in many different ways to create a huge range of immersive experiences, that are unlike anything that has been previously possible.

Virtual and Augmented Reality is a rapidly developing medium: the basic grammar has yet to be established and there are still very few experienced content creators. If you enter VR, AR and MR now, you have the opportunity to pioneer and shape a medium that is likely to have a major impact on the 21st Century.

While mass market VR and AR is a new medium, it builds on a long tradition of technology research. Content creators who don't know the results of this research are likely to make basic mistakes. Goldsmiths staff have decades of experience researching in VR/AR and know the technology well. They are also world experts in the psychology of the VR/AR experience. VR/AR is so different from other media because it creates the illusion of Presence, or being in another place. Understanding how that illusion works is vital to creating great VR/AR experiences.

This masters programme will give you a strong technical background in the skills needed for VR and AR development, with two strands, one focusing on 3D Graphics and User Experience Engineering and the other on programming. This will be combined with a deep understanding of the medium from an artistic and psychological point of view.

You will study topics such as presence, immersive user experience design, virtual characters, social VR, photogrammetry, 3D interaction, machine vision, mixed reality and augmented reality. You will have the opportunity to meet world class VR developers from London and beyond in our regular seminar series and get a start on your career in VR with our work placement programme.

Virtual and Augmented Reality is being used in games, film, medicine, journalism, advertising, education, engineering and many other industries. Your expertise in the medium will open up jobs in this area and many more. Our Industry advisory board helps us ensure that the content you learn will stay relevant to the needs of industry.

The programme is delivered by experts in Virtual and Augmented Reality research as well as industry professionals in 3D graphics art and programming. We aim to equip you with the skills to become a Virtual and Augmented Reality creator ready to help define this new medium. That means a good understanding of the technologies of Virtual and Augmented

Reality and their psychological effects. You will apply this knowledge to develop VR, AR and MR experiences across a range of application areas such as games, arts, education, engineering, and healthcare. You will be encouraged to follow your own interests in VR within the domains you are passionate about.

This is a highly interdisciplinary programme combining technical skills with an understanding of the psychology of VR/AR and the creativity need to develop novel experiences. Goldsmiths has a long tradition of interdisciplinary work in computing, seeing it not simply as a technical discipline but a creative one. Virtual and augmented is one of the best examples of need for this interdisciplinary thinking. Having said that, the programme does provide two pathways depending on the skills that you will bring to the creation of VR and AR. The 3D Graphics and User Experience pathway will focus on 3D graphics design and animation, and the Programming and Computer Science pathway will focus on programming VR environments. Students on each pathway will have opportunities to also pick up skills from the other pathway if they want to work across disciplines.

The programme will culminate in a final project that will allow you to develop a complete, major VR or AR experience of your own. The programme has strong industry links and you will also have the opportunity to do your project as a placement in industry.

Programme entry requirements

A BA or BSc Degree at 2.2 level or above. For the 3D Graphics and User Experience pathway the degree should be in a subject related to visual art or design. For the Programming and Computer Science pathway the degree should be in a subject related to computer science or engineering. Students with a video games related undergraduate will also be well equipped for this programme. Outstanding practitioners or individuals with strong commercial experience and/or a strong portfolio of graphics or programming work may be considered.

Non-native English students should normally have a minimum IELTS score of 6.5 or equivalent.

Aims of the programme

This programme aims to produce a new generation of VR creators who are able to take a lead in defining this new medium. Our graduate will be strongly interdisciplinary, bringing an understanding of the science and technology of VR to their innovative creative practice.

In particular graduates will have:

- An interdisciplinary understanding of Virtual and Augmented Reality encompassing psychology, technology and creative practice
- Strong technical development skills that enable a personal VR and AR creation practice
- Strong transferable skills, in particular the ability to work independently and in groups and to reflectively evaluate their own work.

What you will be expected to achieve

Students who successfully complete either pathway in the Postgraduate Certificate will demonstrate:

Knowledge and understanding

| Code | Learning outcome | Taught by the following module(s) |
|------|---|---|
| A1 | Apply knowledge of the current state in the art of Virtual Reality hardware and software technologies to selecting, implementing and critically evaluating appropriate technologies for a project | Introduction to Virtual Reality |
| A2 | Apply knowledge of the psychological illusions and physiological effects of virtual reality and their causes to design and/or critically evaluate virtual reality experience | Introduction to Virtual Reality |
| A3 | Apply knowledge of a number of technologies and development approaches that are relevant to Virtual Reality, within their original domain | Optional Modules |
| A4 | Critically analyse the applicability of Virtual Reality to a range of domains | Introduction to Virtual Reality Optional Modules |

Cognitive and thinking skills

| Code | Learning outcome | Taught by the following module(s) |
|------|--|-----------------------------------|
| B1 | Critically analyse virtual reality experiences in commercial, applied, and creative contexts | Introduction to Virtual Reality |

Subject specific skills and professional behaviours and attitudes

| Code | Learning outcome | Taught by the following module(s) |
|------|---|-----------------------------------|
| C1 | Design and implement a simple virtual reality project | Introduction to Virtual Reality |
| C2 | Use a range of technologies and development processes to implement simple projects within their original domain | Optional Modules |

Transferable skills

| Code | Learning outcome | Taught by the following module(s) |
|------|--|--|
| D1 | Communicate effectively, both in writing and in presentations to an audience | This will be taught throughout the programme |
| D2 | Work effectively in groups | This will be taught throughout the programme |
| D3 | Take responsibility for, plan and execute independent project work | This will be taught throughout the programme |

In addition to the generic PGCert learning outcomes, students who successfully complete the PGCert (3D Graphics and User Experience pathway) will demonstrate:

Subject specific skills and professional behaviours and attitudes

| Code | Learning outcome | Taught by the following module(s) |
|------|--|---|
| C3 | Design and create 3D graphics and animation assets to a basic professional level | Introduction to Modelling and Animation |

In addition to the generic PGCert learning outcomes, students who successfully complete the PGCert (Programming and Computer Science pathway) will demonstrate:

Subject specific skills and professional behaviours and attitudes

| Code | Learning outcome | Taught by the following module(s) |
|------|---|---|
| C4 | Design and program software systems for 3D graphics to a basic professional level | Introduction to Programming for Games and Interactive Graphics Mathematics and Graphics for Computer Games 1 |

In addition to the learning outcomes for the PGCert, students who successfully complete the Postgraduate Diploma (either pathway) will demonstrate:

Knowledge and understanding

| Code | Learning outcome | Taught by the following module(s) |
|------|--|--|
| A5 | Apply knowledge of the current state in the art of Mixed and Augmented Reality hardware and software technologies to select and implement appropriate technologies for a project | Mixed Realities |
| A6 | Apply in-depth knowledge of a number of specific areas of current Virtual and Mixed Reality research and practice to the development of VR or MR project | Advanced Topics in Virtual and Augmented Reality |

Cognitive and thinking skills

| Code | Learning outcome | Taught by the following module(s) |
|------|--|---|
| B2 | Critically evaluate current research and practice in virtual and mixed reality | Advanced Topics in Virtual and Augmented Reality Mixed Realities |

Subject specific skills and professional behaviours and attitudes

| Code | Learning outcome | Taught by the following module(s) |
|------|--|---|
| C5 | Replicate a piece of research in Virtual and Augmented Reality | Advanced Topics in Virtual and Augmented Reality |
| C6 | Apply research results and contemporary approaches to practice in Virtual and Mixed Reality to the development of small projects | Advanced Topics in Virtual and Augmented Reality Mixed Realities |

In addition to the learning outcomes above, students who successfully complete the MA or MSc will be able to:

Transferable skills

| Code | Learning outcome | Taught by the following module(s) |
|------|---|---|
| D4 | Plan and execute a substantial project under expert supervision | Final Project in Virtual and Augmented Reality (either pathway) |

| Code | Learning outcome | Taught by the following module(s) |
|------|---|---|
| D5 | Manage their time and other resources within the context of a substantial independent project | Final Project in Virtual and Augmented Reality (either pathway) |
| D6 | Present their own work in writing to the standard of published academic research | Final Project in Virtual and Augmented Reality (either pathway) |

In addition to the generic MA/MSc learning outcomes, students who successfully complete the MSc (Programming and Computer Science pathway) will demonstrate:

Cognitive and thinking skills

| Code | Learning outcome | Taught by the following module(s) |
|------|--|--|
| B4 | Apply knowledge of the state of the art in Virtual and/or Mixed Reality research and practice to the design and/or evaluation of a substantial Virtual or Mixed Reality experience or theory, in the context of academic research or industrial practice | Final Project in Virtual and Augmented Reality (3D Graphics and User Experience Pathway) |

Subject specific skills and professional behaviours and attitudes

| Code | Learning outcome | Taught by the following module(s) |
|------|--|--|
| C8 | Develop a substantial Virtual or Mixed Reality 3D graphics and/or user experience project to a professional standard | Final Project in Virtual and Augmented Reality (3D Graphics and User Experience Pathway) |

How you will learn

The Department of Computing is committed to a diverse and stimulating range of learning and teaching methods that ensure the programme outcomes are addressed rigorously and effectively. These may include traditional lectures but the focus will be on interactive and student centred methods. We will make extensive use of flipped classrooms, making use of material from our existing 22-week MOOC on Virtual Reality. Students will have video material from which to learn core material before and after classes and the classes themselves will focus on interactive discussion and practical work.

Much of the teaching will be in a hands-on lab environment with considerable opportunity for self-directed work and peer-to-peer teaching. Students will also be required to actively engage with current research by present and replicating studies.

We will also experiment with the use of Virtual and Augmented Reality itself as a teaching medium. These sessions will be as much about the experience of VR in learning as the learning itself. Students will be encouraged to reflect on the use of VR in their studies to better understand it as an educational medium.

In addition, MA/MSc VAR students will attend a weekly external speaker programme with the MA/MSc Games and PhD Students. Previous speakers include senior people from Creative Assembly, Swrve, Supermassive, Rebellion, Geomerics, Radiant Worlds and many more. Students have opportunity to meet the speakers over coffee after the talks and make useful contacts. Students will be encouraged to attend wider Goldsmiths lectures including the Whitehead Lectures and the Human Interactive Conference.

How you will be assessed

The Department is committed to providing diverse types of assessment. Our methods of assessment are designed to reflect research and commercial activities and to encourage independent creative thinking and working mixed with collaborative work. Students will be required to present their work in a number of different ways including demos with associate code / analytics data, reports and short management reports, oral presentations and software delivery.

Each module in the programme will have its own assignments, reflecting to the nature of the module. In addition to modular assignments, students will have a major final project in the summer term, which should build on what students have learnt throughout the programme. The final project is an opportunity for students to work independently on a large project at a research level or work externally on-site at a company on a placement (which includes delivery of a report).

In collaborative assignment work, particular care must be taken by students to describe clearly and precisely the nature of their contributions, and the contributions of their group collaborators. This must be delivered as part of students' assignment written reports and/or evaluation documentation, as required in the documentation brief.

Final projects will be assessed based on the submission of a final report and a presentation in a viva. Guidance on the structure and writing of the report will be given in the module handbook. Projects will be marked by a panel composed of two members of academic staff.

Marking criteria

| Mark | Descriptor | Specific Marking Criteria |
|---------|--|---|
| 80-100% | Distinction (Outstanding/ Exceptional) | Represents a demonstration of exceptional understanding, insight and achievement of the aspects described in the criteria for a distinction grade. |
| 70-79% | Distinction | Demonstration of excellence in understanding based on a thorough grasp of relevant concepts, methodology and content; display of skill in applying and interpreting complex material; organisation of material at a high level of competence. Students should be able to demonstrate the ability to work independently to research and implement and in some cases extend state-of-the- art technologies. |
| 60-69% | Merit | Demonstration of a deep level of understanding based on a competent grasp of relevant concepts, methodology and content; display of skill in applying interpreting complex material; organisation of material at a high level of competence. Students should be able to demonstrate the ability to work independently to research and implement state-of-the-art technologies. |
| 50-59% | Pass | Demonstration of a sound level of understanding based on a competent grasp of relevant concepts, methodology and content; display of skill in organising, discussing and applying complex material. Students should be able to implement state-of-the-art technologies under guidance. |
| 30-49% | Fail | Represents an overall failure to achieve the appropriate learning outcomes. A mark at this level is given to work which may have some positive features, but is not at Masters standard: for example by lacking structure, having a poor-quality line of argument, or does not demonstrate sufficient application. |
| 10-29% | Bad fail | Represents a significant overall failure to achieve the appropriate learning outcomes at Masters standard. |
| 1-9% | Very bad fail | A submission that does not attempt to address the module's specified learning outcomes. It will be considered a non-valid attempt and the module must be re-sat. |
| 0% | Non submission or plagiarised | Work was not submitted or it was plagiarised. |

How the programme is structured

The programme consists of four elements:

- A common core of Virtual and Augmented Reality modules that are shared between the pathways (60 credits)
- A compulsory technical skills module that is specific to the pathways (15 credits)
- A wide range of optional modules that will allow students to enrich their learning and follow individual interests (45 credits)
- A large scale project and dissertation module, which may either be an academic project conducted at Goldsmiths, or an industry project conducted as part of a placement with a company that is doing relevant VR or AR work (60 credits)

Full-time mode

Pathway in 3D Graphics and User Experience

| Module Title | Module Code | Credits | Level | Module Status | Term |
|--|-------------|---------|-------|---------------|---------|
| Introduction to Virtual Reality | IS71081B | 15 | 7 | Compulsory | |
| Mixed Realities | IS71098A | 15 | 7 | Compulsory | |
| Advanced Topics in Virtual and Augmented Reality | IS71097A | 15 | 7 | Compulsory | |
| Introduction to Programming for Games | IS71030B | 15 | 7 | Compulsory | |
| Optional modules to the value of 45 credits | Various | 45 | 7 | Optional | 1 and 2 |
| Introduction to Modelling and Animation | IS74021A | 15 | 7 | Compulsory | |
| Final Project in Virtual Reality (3D Graphics and User Experience) | IS71100A | 60 | 7 | Compulsory | |

Pathway in Programming and Computer Science

| Module Title | Module Code | Credits | Level | Module Status | Term |
|--|-------------|---------|-------|---------------|------|
| Introduction to Virtual Reality | IS71081B | 15 | 7 | Compulsory | |
| Mixed Realities | IS71098A | 15 | 7 | Compulsory | |
| Advanced Topics in Virtual and Augmented Reality | IS71097A | 15 | 7 | Compulsory | |
| Introduction to Programming for Games | IS71030B | 15 | 7 | Compulsory | |

| Module Title | Module Code | Credits | Level | Module Status | Term |
|---|-------------|---------|-------|---------------|---------|
| Optional modules to the value of 45 credits | Various | 45 | 7 | Optional | 1 and 2 |
| Mathematics and Graphics for Computer Games 1 | IS71021B | 15 | 7 | Compulsory | |
| Final Project in Virtual Reality (Programming and Computer Science) | IS71101A | 60 | 7 | Compulsory | |

Part-time mode

Academic Year of Study 1

Part time students will be given some flexibility in their choice of modules, but it will be recommended that in their first year they take the following compulsory modules:

- Introduction to Virtual Reality (15 credits)
- Mixed Realities (15 credits)
- Introduction to Programming for Games (15 credits)
- Option Modules (15 credits)

Academic Year of Study 2 (and 3)

Part time students will be given some flexibility in their choice of modules, but it will be recommended that in their second year they take the following compulsory modules:

- Advanced Topics in Virtual and Augmented Reality (15 credits)
- Pathway specific skills modules (15 credits)
- Option Modules (30 credits)
- Final Project (60 credits)

Students doing the 3 year part-time mode will do the Final Project (60 credits) in their final year.

Academic support

Support for learning and wellbeing is provided in a number of ways by departments and College support services who work collaboratively to ensure students get the right help to reach their best potential both academically and personally.

All students are allocated a Personal Tutor (one in each department for joint programmes) who has overall responsibility for their individual progress and welfare. Personal Tutors

meet with their student at least twice a year either face-to-face, as part of a group and/or electronically. The first meeting normally takes place within the first few weeks of the autumn term. Personal Tutors are also available to students throughout the year of study. These meetings aim to discuss progress on modules, discussion of the academic discipline and reports from previous years if available (for continuing students). This provides an opportunity for progress, attendance and assessment marks to be reviewed and an informed discussion to take place about how to strengthen individual learning and success.

All students are also allocated a Senior Tutor to enable them to speak to an experienced academic member of staff about any issues which are negatively impacting their academic study and which are beyond the normal scope of issues handled by Programme Convenors and Personal Tutors.

Students are provided with information about learning resources, the [Library](#) and information available on [Learn.gold \(VLE\)](#) so that they have access to department/programme handbooks, programme information and support related information and guidance.

Taught sessions and lectures provide overviews of themes, which students are encouraged to complement with intensive reading for presentation and discussion with peers at seminars. Assessments build on lectures and seminars so students are expected to attend all taught sessions to build knowledge and their own understanding of their chosen discipline.

All assessed work is accompanied by some form of feedback to ensure that students' work is on the right track. It may come in a variety of forms ranging from written comments on a marked essay to oral and written feedback on developing projects and practice as they attend workshops.

Students may be referred to specialist student services by department staff or they may access support services independently. Information about support services is provided on the [Goldsmiths website](#) and for new students through new starter information and induction/Welcome Week. Any support recommendations that are made are agreed with the student and communicated to the department so that adjustments to learning and teaching are able to be implemented at a department level and students can be reassured that arrangements are in place. Opportunities are provided for students to review their support arrangements should their circumstances change. The [Disability](#) and [Wellbeing](#) Services maintain caseloads of students and provide on-going support.

The [Careers Service](#) provides central support for skills enhancement, running [The Gold Award](#) scheme and other co-curricular activities that are accredited via the Higher Education Achievement Report ([HEAR](#)).

The [Academic Skills Centre](#) works with academic departments offering bespoke academic literacy sessions. It also provides a programme of academic skills workshops and one-to-one provision for students throughout the year.

Links with employers, placement opportunities and career prospects

Our existing Computer Games masters programmes have had a very strong recruitment record for students finishing the course, with nearly all students achieving full-time employment within 3 months of leaving. Existing employers of previous MSc Games and Entertainment Students include SONY SCEE, Supermassive, SEGA Creative Assembly, Sports Interactive, GamesLoft, Rebellion, WeRInteractive, Frontier and GameSys. This has been greatly aided by the Summer Term placement scheme we organise where students work onsite at companies for an entire term.

The MA/MSc is expected to emulate this and our existing contacts at companies to lead to jobs for students following completion of the course. Moreover, previous MSc Games and Entertainment students have used their entrepreneurial skills gained on the course to startup companies and gain development contracts and investment. Our programme opens up multiple career options including:

- Games Developer specialising in Virtual and Augmented Reality Games on PC mobile or Sony PlayStation VR
- Creator of Virtual and Augmented Reality experiences for digital agencies specialising in contract work
- Virtual and Augmented Reality artist working either independently or within the context of creative SMEs or larger organisations such as the BBC
- Virtual and Augmented Reality creator associated with more traditional platforms, for example creating VR experiences linked to film, television or games
- Designer of Virtual or Mixed Reality tools for education, for example medical training
- Designer of Virtual or Mixed Reality apps for domains such as healthcare (including mental health), engineering or social media/remote conferencing
- As well as technical developer roles, students would also be well placed for roles such as junior producers in all of these industries

Students might also develop their independent research questions, which could lead to postgraduate research, for example at the Intelligent Games and Game Intelligence Doctoral Training Centre.

The requirements of a Goldsmiths degree

All taught postgraduate degrees have a minimum total value of 180 credits and involve one calendar year of full-time study. Some programmes may extend over more than one calendar year and, when this is the case, they have a higher total credit value. Programmes are composed of individual modules, each of which has its own credit value. Part-time students normally take modules to the value of 90 credits each year. If a programme has a part-time pathway, the structure will be set out in the section “How the programme is structured” above. Normally, all modules are at level 7 of the Framework for Higher Education Qualifications.

More detailed information about the structure and requirements of a Goldsmiths degree is provided in the [Goldsmiths Qualifications and Credit Framework](#).

Modules

Modules are defined as:

- “Optional” – which can be chosen from a group of modules
- “Compulsory” – which must be taken as part of the degree

Progression

Some programmes may require students to pass specific modules prior to completion of the dissertation/major project (or equivalent). Additionally, where a programme of study extends beyond one calendar year, students may be required to pass specific modules in their first year of study before progressing to the second year. Where this is the case, these requirements will be set out in this Programme Specification.

Award of the degree

In order to graduate, students must successfully complete all modules specified for the programme, as set out within the section “How the programme is structured” above.

Classification

Final degree classification is calculated on the basis of a student’s mean average mark (based on credit value) across all modules on the programme.

Masters degrees are awarded with the following classifications:

Distinction – 70%+

Merit – 60-69%

Pass – 50-59%

More detail on the [calculation of the final classification](#) is on our website.

Interim exit awards

Some programmes incorporate interim exit points of Postgraduate Certificate and/or Postgraduate Diploma, which may be awarded on the successful completion of modules to the minimum value of 60 credits or 120 credits respectively. The awards are made without classification.

When these awards are incorporated within the programme, the relevant learning outcomes and module requirements will be set out within the “What you will be expected to achieve” section above.

The above information is intended as a guide, with more detailed information available in the [Goldsmiths Academic Manual](#).

Programme-specific rules and facts

In order to progress to the Final Project, students must fulfil the requirements for a pass at PGDip level (pass all 120 credits of taught modules).

General programme costs

In addition to your tuition fees, you will be responsible for meeting standard costs associated with your study. Find out more information at gold.ac.uk/programme-costs.

Specific programme costs

Not applicable.

How teaching quality will be monitored

Goldsmiths employs a number of methods to ensure and enhance the quality of learning and teaching on its programmes.

Programmes and modules are formally approved against national standards and are monitored throughout the year, such as in departmental committees, a variety of student feedback mechanisms and through the completion of module evaluation questionnaires. Every programme has at least one External Examiner who reviews comments annually on the standards of awards and student achievement. External Examiner(s) attend Boards of Examiners meetings and submit an annual written report.

Modules, programmes and/or departments are also subject to annual and periodic review internally, as well as periodic external scrutiny.

Quality assurance processes aim to ensure Goldsmiths' academic provision remains current, that the procedures to maintain the standards of the awards are working effectively and the quality of the learning opportunities and information provided to students and applicants is appropriate.

Detailed information on all these procedures are published on the [Quality Office web pages](#).