MA/MSc Virtual and Augmented Reality
Programme Specification

Awarding Institution:

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

Teaching Institution: Goldsmiths, University of London

Final Award:

Programme Name:

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

MSc Virtual and Augmented Reality (Programming and Computer Science) Internship Pathway

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

MSc Virtual and Augmented Reality (Programming and Computer Science) Research Pathway

Total credit value for programme: 180

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: 7

Programme accredited by: Not applicable

Date Programme Specification last updated/approved: April 2023

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 media 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 are rapidly developing media: 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 are relatively new as media, they build 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 Computer Science and 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. We have strong links with industry,

including regular industry talks and demo days in which industry representatives visit to see you demo your work and give feedback. About 40% of students do internships in industry rather than a final research project. Of these almost all are offered permanent jobs in the company. This reflects the intense demand for the skills taught by the programme, which results in a large majority of students, whether they do internships or not being hired very rapidly after graduation. We also have many non-commercial collaborations, which result in collaborative projects, in which you will do a VR project with experts in a relevant field in Goldsmiths, other universities or other non-profit institutions such as museums or hospitals. Examples include healthcare, psychiatry, museums, social work, and the arts. Our collaborators have included institutions in the UK (e.g. Oxford), USA, Switzerland, Germany, Catalonia and Singapore.

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. There is also a lot of potential to adapt the programme to your own interest with many projects in which you can choose the subject area. We particularly encourage individual expression, developing particular applications of VR and AR and addressing important social and environmental issues. We also pride ourselves on diversity and inclusion and are proud of having an equal gender split and being multi-ethnic and global both in terms of our student body and teaching team. We believe that we have already had an impact on improving the diversity of the London VR and AR industry after only 3 years of running our masters.

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. Students

interested in an internship or industry placement should enrol on the respective internship pathway. Students who prefer to pursue a research or academic career, should enrol on the Research pathways. Students might be able to switch between the two pathways during the year, on a case-by-case basis (if, for example a student on the internship pathway is unable to arrange an internship). When no otherwise specific, the names MA and MSc VAR refer to both internship and research pathways, as they only differ in the nature of the final project.

Programme entry requirements

A BA or BSc Degree at 2.1 level or above. For the 3D Graphics and User Experience pathway the degree should be in a subject related to visual art or design, and require a strong portfolio of digital creative work. 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 from other backgrounds 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.

Programme learning outcomes

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 Augmented Reality hardware and software technologies to select and implement appropriate technologies for a project	Augmented Reality
A2	Apply knowledge of a number of technologies and development approaches that are relevant to Virtual and Augmented Reality, within their original domain	Optional Modules

Code	Learning outcome	Taught by the following module(s)
A3	Critically analyse the applicability of Augmented Reality to a range of domains	Augmented Reality Optional Modules

Cognitive and thinking skills

Code	Learning outcome	Taught by the following module(s)
B1	Critically analyse Augmented reality experiences in commercial, applied, and creative contexts	Augmented Reality

Subject specific skills and professional behaviours and attitudes

Code	Learning outcome	Taught by the following module(s)
C1	Design and implement a simple augmented reality project	Augmented Reality Introduction to Programming for Games and Interactive Graphics
C2	Use a range of technologies and development processes to implement simple projects within their original domain	Optional Modules

Transferable skills (Elements)

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)
A4	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	Virtual Reality
A5	Apply knowledge of the psychological illusions and physiological effects of virtual reality and their causes to design and/or critically evaluate virtual reality experience	Virtual Reality
A6	Apply in-depth knowledge of a number of specific areas of current Virtual and Augmented Reality research and practice to the development of VR or AR projects	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

Subject specific skills and professional behaviours and attitudes

Code	Learning outcome	Taught by the following module(s)
C5	Design and implement a simple virtual reality project	Virtual Reality
C6	Perform a research study in Virtual and Augmented Reality	Advanced Topics in Virtual and Augmented Reality
C7	Apply research results and contemporary approaches to practice in Virtual and Augmented Reality to the development of small projects	Advanced Topics in Virtual and Augmented Reality Virtual Reality

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

Transferable skills (Elements)

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)
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:

Subject specific skills and professional behaviours and attitudes

Code	Learning outcome	Taught by the following module(s)
C8	Design and program a Virtual or Augmented Reality software system to a professional standard	Research or Internship Project in Virtual and Augmented Reality

Code	Learning outcome	Taught by the following module(s)
		(Programming and Computer Science pathway)

In addition to the generic MA/MSc learning outcomes, students who successfully complete the MA (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)
C9	Develop a substantial Virtual or Mixed Reality 3D graphics and/or user experience project to a professional standard	Research or Internship Project in Virtual and Augmented Reality (3D Graphics and User Experience Pathway)

In addition to the generic MA/MSc learning outcomes, students who successfully complete the Internship pathway will demonstrate:

Subject specific skills and professional behaviours and attitudes

Code	Learning outcome	Taught by the following module(s)
C10	Work effectively and collaboratively in the Virtual and Augmented Reality industry	Internship Project in Virtual and Augmented Reality (Programming and Computer Science pathway)

In addition to the generic MA/MSc learning outcomes, students who successfully complete the Research pathway will demonstrate:

Subject specific skills and professional behaviours and attitudes

Code	Learning outcome	Taught by the following module(s)
C11	Undertake a piece of rigorous academic research in the field of Virtual and Augmented Reality	Research Project in Virtual and Augmented Reality (Programming and Computer Science pathway)

Mode of study

On Campus

Programme structure

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).

Students in the MA and MSc in Virtual and Augmented Reality have the choice of doing either an internship with an external company, or a research project and will enrol on the relevant pathway which will be reflected in their final award title. In all other respects, the internship and research pathways are equivalent to each other; the only difference is the final project. Under certain circumstances, it may be possible to switch between the internship and research pathway (if, for example a student is not able to arrange an internship).

Full-time mode

Pathway in 3D Graphics and User Experience (Internship)

Module Name	Module Code	Credits	Level	Module Type	Term
Virtual Reality	TBC	15	7	Compulsory	2
Augmented Reality	TBC	15	7	Compulsory	1
Advanced Topics in Virtual and Augmented Reality	TBC	15	7	Compulsory	2
Games Programming 1 or Visual Game Development	TBC	15	7	Compulsory	1
Introduction to Modelling and Animation	TBC	15	7	Compulsory	1

Module Name	Module Code	Credits	Level	Module Type	Term
Optional modules to the value of 45 credits	Various	45	7	Optional	1&2
Internship Project in Virtual Reality (3D Graphics and User Experience) (for students on the Internship pathway)	TBC	60	7	Compulsory	3

Students in the MA VAR with no previous experience of programming, should take "Visual Game Development" as their compulsory programming module. Students with programming experience may take "Games Programming 1" instead.

Pathway in 3D Graphics and User Experience (Research)

Module Name	Module Code	Credits	Level	Module Type	Term
Virtual Reality	TBC	15	7	Compulsory	2
Augmented Reality	TBC	15	7	Compulsory	1
Advanced Topics in Virtual and Augmented Reality	TBC	15	7	Compulsory	2
Games Programming 1 or Visual Game Development	TBC	15	7	Compulsory	1
Introduction to Modelling and Animation	TBC	15	7	Compulsory	1
Optional modules to the value of 45 credits	Various	45	7	Optional	1&2
Research Project in Virtual and Augmented Reality (3D Graphics and User Experience Pathway) (for students on the Research pathway)	TBC	60	7	Compulsory	3

Pathway in Programming and Computer Science (Internship)

Module Name	Module Code	Credits	Level	Module Type	Term
Virtual Reality	TBC	15	7	Compulsory	2
Augmented Reality	TBC	15	7	Compulsory	1
Advanced Topics in Virtual and Augmented Reality	TBC	15	7	Compulsory	2
Games Programming 1	TBC	15	7	Compulsory	1
Mathematics for Games and V&AR	TBC	15	7	Compulsory	1
Optional modules to the value of 45 credits	Various	45	7	Optional	1&2
Internship Project in Virtual Reality (Programming and Computer Science)	TBC	60	7	Compulsory	3

Pathway in Programming and Computer Science (Research)

Module Name	Module Code	Credits	Level	Module Type	Term
Virtual Reality	TBC	15	7	Compulsory	2
Augmented Reality	TBC	15	7	Compulsory	1
Advanced Topics in Virtual and Augmented Reality	TBC	15	7	Compulsory	2
Games Programming 1	TBC	15	7	Compulsory	1
Mathematics for Games and V&AR	TBC	15	7	Compulsory	1
Optional modules to the value of 45 credits	Various	45	7	Optional	1&2
Research Project in Virtual and Augmented Reality (Programming and Computer Science Pathway)	TBC	60	7	Compulsory	3

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:

- Virtual Reality (15 credits)

- Augmented Reality (15 credits)
- Introduction to Programming for Games (15 credits)
- Option Module (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 2 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 three 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 Centre for Academic Language and Literacies 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

Placement opportunities

Students are able to take a paid placement in place of an academic final project. We have a strong network of VR and AR companies and studios and have a succeeded in placing a large number of students, the majority of which have gone on to permanent jobs in the organisation. In additional to paid commercial placement, we offer the option of projects that are sponsored and co-supervised by non-profit organisations (e.g. healthcare) or other academic departments or institutions.

Employability and potential career opportunities

Our programme so far has a strong record of employability with the XR sector. Out of the over 30 students graduated from the first two cohorts collectively, many received job offers from London-based creative studios such as Maze Theory, Dream Reality Interaction, Arcade; and internationally companies such as Meta, NetEase and Perfect World. For instance, from our first cohort 2019-20, Hankun Yu was the lead developer of a VR game, "The Pirate Queen" which has won the Raindance Immersive 2021 Best Debut Award; Prentice Whitlow was named in Bima 100, an award set up to recognise the UK's most influential people in digital & tech. Eleven out of our current cohort (40 students) now received a paid internship offer or involved in a funded research project, including a research group in Zurich, working on creating VR scenarios to train social workers, and a funded research project with Oxford University to create immersive museum experiences. Our programme opens 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 these industries

Many students might also develop their independent research questions, which could lead to postgraduate research. Out of the over 30 students graduated from the first two cohort, 4 have published their theses in the top research conference (IEEE VR), 1 student who published a full paper is now doing a PhD in this area.

Students are supported from the start to the finish of this programme in order to understand the different potential career journeys they can follow and to build a portfolio of work to demonstrate their capability to gain employment or freelance work in that area. Assessment has been designed to facilitate this process through the development of transferable or soft skills listed in the section above. Regular guest lectures from industry support the development of sector knowledge and awareness of different career paths.

The Department's External Advisory Board ensures relevance of all our programmes to the current and future needs of employers. All programmes are designed in consultation with employers to make sure you develop transferable skills to improve your career opportunities and you will be applying your skills to real-world problems through live project briefs and group projects. The board and other employers attend showcase events where you can present your ideas, get feedback and build important connections.

We have dedicated employability resource within the department to build employer relations and manage additional initiatives to support your future career opportunities, including regular communication of external opportunities for mentoring and work experience and an annual Career week (a focussed week of career support every June in the department where you can access alumni panels by programme and a range of industry talks).

Programme-specific requirements

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).

Tuition fee costs

Information on tuition fee costs is available at: https://www.gold.ac.uk/students/fee-support/

Specific programme costs

None