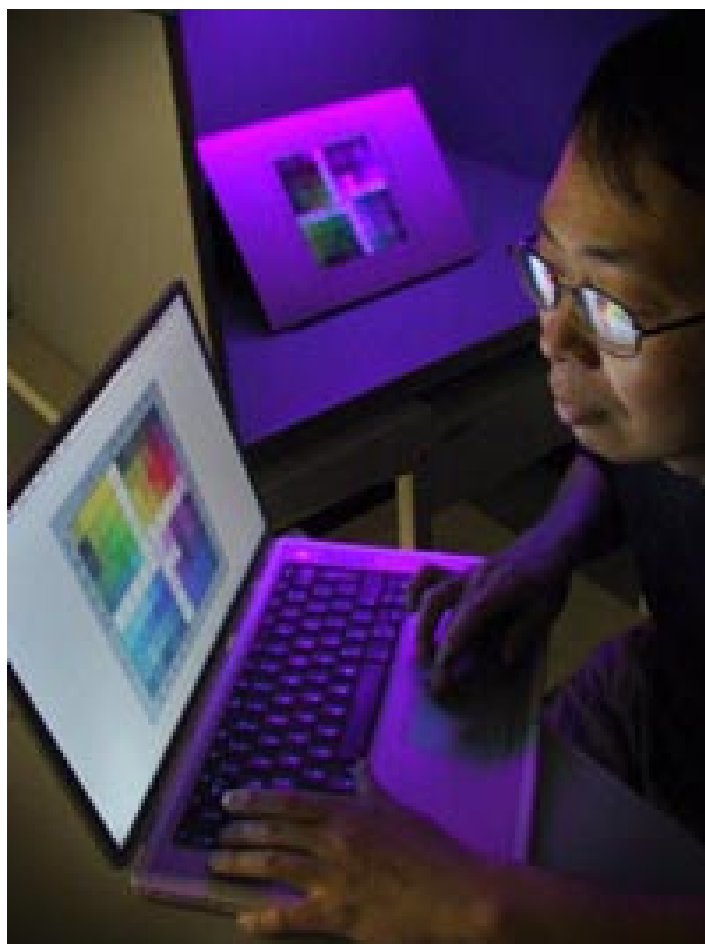


# MSc Digital Colour Imaging

## (by Project)



## Course Outline

**Full time (one year) or part time (two years)**

THE LONDON  
INSTITUTE **LONDON COLLEGE OF PRINTING**  
CAMBERWELL COLLEGE OF ARTS CENTRAL  
SAINT MARTINS COLLEGE OF ART AND DESIGN  
CHELSEA COLLEGE OF ART AND DESIGN  
LONDON COLLEGE OF FASHION

**Colour Imaging Group, School of Printing & Publishing**

**Introduction**

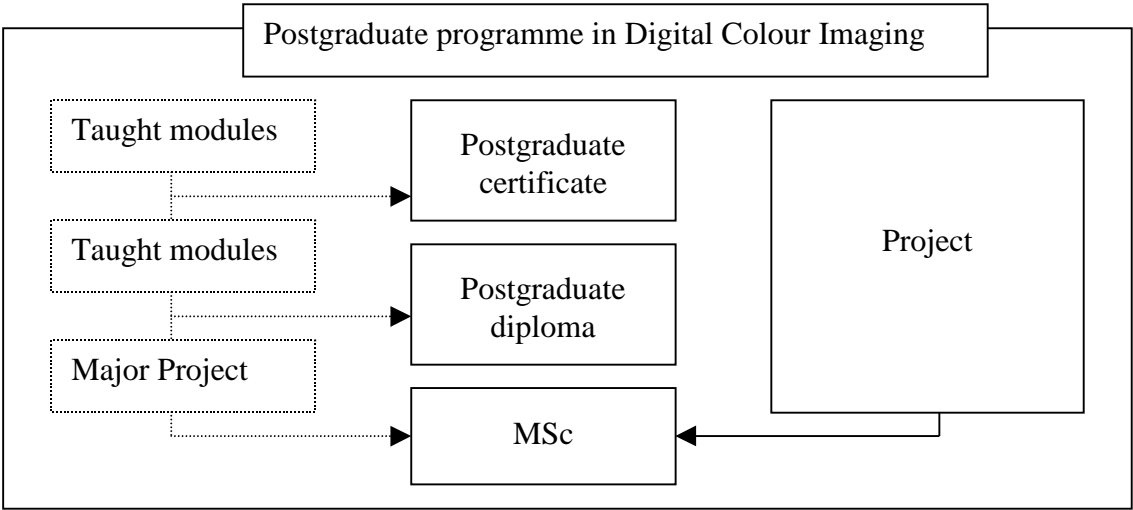
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The MSc Digital Colour Imaging (by Project) is for those students who wish to undertake a single programme of research rather than a taught course.

The MSc is an element of the Postgraduate Programme in Digital Colour Imaging, which aims to meet the needs of students wishing to develop an advanced understanding of imaging technologies.. The programme offers an opportunity to engage with colour imaging at an advanced level, to explore individual interests with the support of subject experts and other imaging professionals, and to develop knowledge and skills of critical importance to the development of a career in any field of imaging technology.

The programme has a strong research focus, and candidates who already possess some of the skills needed to engage in colour imaging research may apply to complete the whole programme by addressing a single research question or problem in colour imaging through the MSc Digital Colour Imaging (by Project).

Students who enrol on the MSc by Project but do not continue beyond the research methods and literature review stage may apply to transfer to the taught pathway.



*Colour imaging and graphic arts*

New technologies enable visual communications to be made on an expanding range of media, both physical and electronic. The programme is concerned with colour imaging technologies that support visual communication in a wide range of different media. Some of the fundamental technologies addressed in the course are also relevant to specialist applications of digital imaging such as the acquisition and interpretation of image data in scientific fields, including medicine, forensics, geographic information systems and space imaging. The unique approach of the course lies in its emphasis on the role of colour imaging in the graphic arts industry, and this differentiates it from other related courses at postgraduate level.

The requirement to reproduce colour images with optimal quality on these different media has created great challenges and opportunities for existing professionals and for new graduates in the imaging industries.

*The London College of Printing*

A constituent college of the London Institute, the LCP is one of the leading specialist institutions in the field of communications in the world. It comprises specialist schools in Printing and Publishing, Media, Graphic Design, Retail Studies and Marketing and Management.

### *The School of Printing and Publishing*

The School of Printing and Publishing has an outstanding reputation in research and teaching in colour and reproduction, with a large number of staff active in teaching, research, publication and consultancy. The School has a long-standing strength in colour printing and printing materials technology, and is a leading centre for the study of digital printing. The School is equipped for the study of all the major printing processes, recent additions including a four-colour Heidelberg Quickmaster DI digital press.

The School offers a wide range of study in digital imaging and digital media from short courses through to a degree scheme and collaborative international programmes. Digital imaging also forms part of the curriculum in other undergraduate and postgraduate courses such as the Publishing and Digital Media programmes. The School has strong links to industry, external research bodies, and to other specialist courses within the London College of Printing such as the Schools of Graphic Design and Media.

### *Colour Imaging Group*

The course is delivered by members of the Colour Imaging Group within the School of Printing and Publishing. This group makes a strong contribution to international research and standards activities in colour imaging and graphic arts, and its members participate in bodies such as the Society for Imaging Science and Technology, the Graphic Technology committee of the ISO, the international colour standards body CIE, the newspaper research organisation IFRA, the International Colour Consortium, the Technical Association of the Graphic Arts, and the International Association of Research Institutes in the Graphic Arts.

### *Links with other courses and institutions*

As a participant on this postgraduate programme you will be part of a community of enquiry in colour imaging, which includes students on the taught programme and on research degrees. There are also exciting opportunities for links to be made between the different college disciplines within the London College of Printing.

The Colour Imaging Group has links to other centres of postgraduate study and research in colour imaging, including the Colour and Imaging Institute at the University of Derby. In addition, the School has developed links with many major manufacturers and vendors of digital imaging equipment, as well as users of digital reproduction technologies such as printing and photography. Where appropriate, it may be possible for you to complete your projects in conjunction with another institution of the above type, or with a sponsoring employer.

### *Target audience*

The course is aimed at those working in imaging and colour reproduction who wish to develop their understanding of colour imaging at postgraduate level. It will be of particular interest to those working in photography, publishing, printing, and imaging applications and equipment. The course has developed particular strengths in colour imaging in the prepress, newspaper and cultural heritage sectors.

The programme will also be of interest to those who wish to prepare for a research degree.

All candidates will need an ability to work independently and to sustain a high level of motivation and commitment throughout the programme of study. Depending on their chosen project, candidates will also need some familiarity with topics such as colour science, colour management and programming.

### *Modes of study*

The programme is offered in both full-time and part-time modes. This is intended to meet the needs of both those for whom a shorter and more intensive period of study is preferable, and those in employment for whom a part-time mode would be more attractive as it would allow them to combine study with work.

## Course aims and objectives

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	<b>The course aims to develop:</b>
1	a systematic understanding of knowledge in colour imaging, informed by a critical awareness of current problems and recent research
2	a framework within which participants can continue to develop the knowledge and intellectual skills that will enable them to deal with the imaging technologies of the future
3	a conceptual understanding that enables the participant to critically evaluate past and present research in colour imaging
4	a comprehensive understanding of techniques applicable to research in colour imaging, and a practical understanding of how such techniques are applied to interpret and advance existing knowledge
5	a community of enquiry and research in colour imaging, with links to other such communities nationally and internationally
	<b>The course objectives are that participants will be able to:</b>
1	demonstrate an understanding of colour science and technology, and apply this in practical applications in the context of image reproduction
2	communicate the results of their work clearly to specialist and non-specialist audiences
3	demonstrate a quantitative understanding of colour and colour measurement, and an ability to render a colour appearance across different media
4	demonstrate an advanced knowledge of imaging processes, including capture and digitisation, processing, and output on a range of media and devices, and originality in its application
5	critically evaluate their own work, identify weaknesses and propose alternative solutions
6	plan and conduct a self-managed programme of research and enquiry

## Course structure

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A high level of commitment is necessary to achieve the course objectives. As a guide, the Research Methods taught module requires a total of 200 hours of study (including taught sessions, independent study and project work). The project requires approximately 1600 hours of study, including planning, development, and writing. You will thus need to plan your time carefully.

In addition to formal teaching sessions, you will also engage in independent study, course work, project work and (at MSc level) the preparation of a major project, for which tutor support is provided through individual tutorials and e-mail.

During the taught module, formal teaching normally takes place over one day per week. The MSc is offered over twelve months full time, or 24 months part time.

The course is based on a credit framework. 20 credits are awarded for the taught module, 40 credits for the literature review, 90 credits for the execution and write-up of the project, and 30 credits for the preparation of a paper for publication.

Equivalent and appropriate modules taken at other institutions will be considered for credit transfer in place of the taught module on the present course, and, similarly, you may, where appropriate, transfer credits gained on this course to other programmes of study.

### *Course structure*

The course is divided into three phases.

#### **Phase 1**

In the first phase of the project, you will undertake a study of research methods in colour imaging, develop a research question and project proposal, and prepare a review of the research literature relevant to your topic.

#### **Phase 2**

In Phase 2, you will carry out the practical work needed to realise the project. This will typically involve design of experiments, characterization of devices and media used, preparation of samples, and physical and psychophysical measurements.

You will write up the work completed, and additionally prepare a summary following the conventions of a publication in a suitable research conference or journal.

A version of this summary will be presented (in either written or oral form) to an audience of industrial users or postgraduate students.

### *Attendance on the taught mode of the MSc Digital Colour Imaging*

Candidates undertaking the MSc by Project are also able to attend lectures and workshops delivered as part of the Postgraduate Programme in Digital Colour Imaging, where the course team agree that it will assist in completing the project. The taught modules currently available are listed below, and further details and a module timetable are provided in the Supplementary Handbook.

Colour Perception and Measurement	Programming for Colour Imaging
Colour Imaging Systems	Colour Management

Attendance on these sessions is not considered part of the total study time for the MSc (by Project), and no credit can be awarded for such attendance.

## Course structure

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<b>Phase</b>	<b>Content</b>	<b>Credits</b>
<b>1</b>	Research Methods in Colour Imaging (taught module)	20
	Literature review	40
<b>2</b>	Planning and execution of experimental work Written project report	90
	Preparation of paper for publication Presentation to a non-specialist audience	30
<b>Total</b>		<b>180</b>

## Assessment policy

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The aims of the assessments for this course are:

- to ensure that the programme objectives and learning outcomes have been achieved
- to provide a vehicle for the development of new practical and intellectual skills and a focus for study, practice and self-evaluation
- to provide a means of feedback on your progress and achievement in the course
- to provide an equitable, reliable and timely measure of achievement with a minimum of subjective bias.
- to provide a mechanism for peer review of the final outcomes of the project

### Assessment requirements

You must successfully complete the following (or provide evidence of having completed an equivalent module at another institution):

Research Methods in Colour Imaging: Report on experiment and project proposal

Literature Review: A summary of the research literature relevant to your research question

Project report: A detailed description of the work undertaken, and the results

Paper: A summary of the work and the principal findings for submission to a conference or journal, and presented orally to a industrial or postgraduate audience.

Submission dates for the taught module and the different phases of the project are given in the Supplementary Handbook.

### Assessment details

The main project will take the form of the identification of a research question in digital imaging, and the development of a solution. Elements of the solution will typically include a literature review, a practical activity such as an experiment or the development of a software application, an analysis of the results, and the publication of the final outcomes of the project.

The assessment of the taught module is split into two separate elements, in order to provide an assessment point and feedback during the course of the taught element in addition to a final assessment after the completion of the module. As a guide, the total length of the written work submitted for the taught module should be approximately 3-4000 words.

The Literature Review summarises previous published work on colour science and imaging systems relevant to the problem being studied, and will be approximately 10 000 words. In addition, the project supervisor will set a series of tasks that provide an opportunity to demonstrate the ability to apply the research tools that will be used in the project.

The Project report will give a full description of the work undertaken, and should be approximately 20 000 words in length.

The Paper will be approximately 4000 words in length. This will be assessed by peer review, using the criteria appropriate to the conference or journal to which it is intended to submit the paper. [You are strongly encouraged to publish the paper in this way, but final acceptance for publication by the conference programme committee or journal editorial board is not a requirement for the award of MSc.] You will also prepare a version of the paper for a broader audience, which you may present in written form (e.g. in the form of a technical article for a trade journal) or orally (e.g. in the form of a presentation at an industry event or a postgraduate meeting).

### Assessment feedback

Detailed feedback is provided on all assessed elements of work submitted. You are encouraged to submit drafts in advance of an assessment deadline in order to obtain feedback on the content, style and structure of the work. Summative feedback is provided with assessment grades on work submitted for final assessment.

## **Learning and teaching strategies**

### *Research methods in colour imaging*

The taught element of the programme is delivered largely through lectures and practical workshops. Course members will typically spend 30% of the total study time for the taught module in lectures and workshops, and in laboratory open access sessions.

Practical workshops will usually be based in computer rooms or laboratories, while lectures, theoretical workshops and seminars will take place in lecture/seminar rooms. Other activities may include attendance at conferences and visits to imaging companies.

The emphasis in workshops and seminars will be on your active participation in the learning process, and you will be expected to contribute to these sessions and share insights from your studies and your professional experience. You will also be asked to present aspects of your work to other course members in either a formal or informal context.

### *Literature review, Project and Paper*

The project will require an ability to work independently, together with a sustained commitment over the period of the course. You are expected to define and solve the problem presented in a way which satisfies the relevant assessment criteria and develops your own professional interests. The role of the subject tutors in this situation is to act as advisors and facilitators rather than simply as sources of knowledge, and to indicate how to acquire the practical and theoretical tools with which your projects may be completed. You will need to plan and conduct a programme of reading and laboratory work, and write up the results of this work, using contact with your project supervisor to aid you in the direction of the work.

A viable project proposal is essential to the programme. You will complete this proposal as part of the Research Methods in Colour Imaging module.

As you develop the practical and written work of the project, you will discuss your progress and any problems with the project supervisor. You will be expected to submit a series of drafts of any written work, and the schedule for such drafts will be agreed between you and the supervisor.

As in the Research methods module, you will also be asked to present aspects of your work to other course members in either a formal or informal context. Each year a Postgraduate Meeting will be held, at which you will have an opportunity to present your project and discuss it with other students of colour and imaging. Such events will provide feedback through the project on the relevance of your project and the results you obtain. There will also be opportunities throughout the year to meet, discuss and collaborate with other postgraduate students of colour imaging, both in the London College of Printing and in other specialist institutions.

A Supplementary Handbook is published each year with details of current resources available to students on this course and more widely within the School and college, together with a timetable of taught modules and details of assessment deadlines. A separate Module Handbook is published for the Research Methods module, giving details of the lecture and workshop programme for the module, guidance on assessment, further readings and other information. A Project Handbook is made available on commencing the project phase, which gives details of the form of presentation of the final submission of both Project and Paper. A Coursework Guidelines booklet gives details of the requirements for layout and presentation of all written work on the course, including methods of referencing.

A Course CD is published each year, which includes a large body of resources including documents, spreadsheets, data files, scripts, applications and images. Further resources are made available through the Internet and occasionally through additional resource CDs for particular elements of the programme.

The Internet is used extensively for communication with the course team and between students, and you are encouraged to play an active role in such interactions.

## Research methods in colour imaging – taught module

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Phase:	1	Lectures:	14
Credit Value:	20	Practical workshops:	28
Level:	M	Access to facilities:	18
Indicative Learning Hours	200	Self Directed Study:	140

### Aim

This module develops an understanding of the methods appropriate to research in colour imaging.

### Learning outcomes

On completion of this module you will be able to:

- Define a research question and select an appropriate research design
- Carry out a literature survey
- Conduct experiments in colour imaging
- Select and use methods of data analysis appropriate to the research design.
- Produce a formal research report and presentation.
- Develop a proposal for a research project in the form of a Major Project proposal.

### Indicative content

- Concepts in research methods
- Defining a research question
- Designing experiments
- Psychophysical experiments for assessment of colour and images
- Data analysis
- Presenting research outcomes

### Assessment requirements

This module will be assessed through a project in the application of research methods to problems in colour imaging.

### Assessment criteria

Assessment criteria are based on the learning outcomes for this module, and on the assessment criteria on pages 6-7 above. Further details and examples are given in the Module Handbook.

### Teaching and learning methods

Lectures, seminars and practical workshops

### Facilities

Colour science laboratory, colour imaging equipment

## Literature Review

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Phase:	1	Supervision:	6
Credit Value:	40	Access to facilities:	44
Level:	M		
Indicative Learning Hours	400	Self Directed Study:	350

### Aim

Completion of the literature review develops an understanding of colour science and colour imaging systems relevant to the chosen topic.

### Learning outcomes

On completion of the literature review you will be able to:

- demonstrate an understanding of colour science and technology, and its application in the context of your project
- demonstrate a quantitative understanding of colour, colour measurement, and the cross-media colour reproduction tasks that will be applied in your project
- demonstrate an advanced knowledge of imaging processes, including capture and digitisation, processing, and output on a range of media and devices
- identify and evaluate the previous work that is relevant to your research question, including the experimental design and data analysis methods used
- identify and apply methods of data analysis appropriate to the research design of the project

### Assessment requirements

The literature review should be approximately 10 000 words in length, and should summarize the previous work on the topic under investigation. The literature studied should include both textbooks (a list of recommended texts will be provided) and research papers published in the journals and conference proceedings listed on p13 and other similar publications.

Where the review includes quantitative methods which are to be applied in the Project (such as transformations between colour spaces, characterization of devices, or analysis of experimental results) you will be expected to demonstrate an ability to apply such methods to sample data.

The review will be assessed by the project supervisor and another member of the course team.

### Assessment criteria

Assessment criteria are based on the learning outcomes above, and on the assessment criteria on pages 6-7.

### Facilities

Library, colour science laboratory, colour imaging equipment

## Project

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Phase:	2	Supervision:	16
Credit Value:	90	Access to facilities:	234
Level:	M		
Indicative Learning Hours	900	Self Directed Study:	650

You will undertake a major piece of work in which the emphasis will be on the resolution of a problem in colour imaging through a programme of original research.

The project proposal will be developed as part of the Research Methods in Colour Imaging module. The proposal will be negotiated between you and the assigned supervisor. A list of current topics suitable for projects is published in the Supplementary Handbook each year, and you may choose from this list or negotiate one that better reflects your own interests and career development.

Following the development of the project proposal and the completion of the Literature Review in Phase 1, the project will normally consist of the following discrete stages:

1. The design and execution of practical or experimental work that is expected to result in some resolution of the problem
2. A written description of the work undertaken which analyses and interprets the results and evaluates what has been achieved.

The written description of the work is presented in the form of a bound volume, together with any electronic artefacts or data produced as part of the project or that are required for its assessment. This element of the project should be approximately 20 000 words in length.

A project handbook will be issued to you on commencing this element of the course, giving more guidance on the completion of the project. Support and feedback will be available for the project throughout the year, through meetings with your project supervisor, e-mail and personal tutorials.

You are encouraged to seek sponsorship for your major project from employers, industrial partners or collaborating institutions.

### Learning outcomes

On completion of the project, you should be able to:

- Plan and conduct a substantial self-managed programme of research and enquiry
- Design practical and experimental work that solves an original problem in colour imaging
- Analyze, interpret and evaluate the results of practical and theoretical work
- Present the results in a professional style

### Assessment criteria

Assessment criteria for the Project are based on the assessment criteria on pages 6-7. Specific criteria for assessing the project outcomes will be agreed between you and the project supervisor (and subject to approval by the external examiner) at the commencement of Phase 2 of the course.

### Facilities

Colour imaging student laboratory  
Colour imaging metrology laboratory  
Psychophysics laboratory

## Paper

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Phase:	2	Supervision:	4
Credit Value:	30	Access to facilities:	46
Level:	M		
Indicative Learning Hours	300	Self Directed Study:	250

### Aim

The Paper provides an opportunity to following the conventions of a scientific paper published in a journal or conference proceedings.

### Learning outcomes

On completion of this module you will be able to:

- Present the results of your project in a professional style

### Indicative content

- Presenting research outcomes
- Style of written papers for publication in technical journals and proceedings
- The peer review process
- Oral and poster presentation at research conferences

### Assessment requirements

A technical Paper of approximately 4000 words, which will be reviewed by at least two reviewers, including a member of the course team and an external examiner. You will be expected to address the review comments before submitting the Paper for final assessment. A version of the Paper is also to be presented in a more informal context, in the form of a written article for an industry trade journal or orally at a technical meeting or postgraduate meeting.

### Assessment criteria

Assessment criteria for the Paper will be based on those those applied by the program committee or editorial board of the conference or journal to which the paper is to be submitted

### Teaching and learning methods

Lectures, seminars and practical workshops

### Facilities

Seminar room, software for preparing graphs and plots.