

PROGRAMME SPECIFICATION



1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	MSc/PG Dip
4	Programme Title	Petroleum Geochemistry
5	Programme Code	5034/3324
6	Programme Accreditation	JBM, GeolSoc
7	QAA Subject Benchmark(s)	Engineering
8	FHEQ Level	7
9	Last updated	May 2013

10 Programme Aims

1. To provide the theoretical and practical training necessary to equip Earth science or chemistry graduates with the advanced knowledge and skills appropriate for successful careers in the petroleum, environment and related service industries.
2. To provide the training necessary to allow the conversion of skilled Earth science and chemistry graduates into petroleum geochemists capable of further academic research.
3. To provide a programme that meets the accreditation requirements of the Joint Board of Moderators (JBM www.jbm.org.uk) for Further Learning for a Chartered Engineer (CEng) for candidates who have already acquired an Accredited CEng (Partial) BEng(Hons) or an Accredited IEng (Full) BEng/BSc (Hons) undergraduate first degree.
- 4.) To provide a programme designed to achieve the EC^{UK} Output Standards for Accredited Engineering Programmes and take account of the QAA's FHEQ Qualification Descriptors, the QAA Subject Benchmark Statement for Engineering, and the University's Graduate Skills Framework.

EC^{UK} Output Standards for Accredited Engineering Programmes:

<http://www.engc.org.uk/ecukdocuments/internet/document%20library/AHEP%20Brochure.pdf>

QAA's FHEQ Qualification Descriptors:

<http://www.qaa.ac.uk/AssuringStandardsAndQuality/Qualifications/Pages/default.aspx>

QAA Subject Benchmark Statement for Engineering:

<http://www.qaa.ac.uk/Publications/InformationAndGuidance/Pages/Subject-benchmark-statement-Engineering-.aspx>

University's Graduate Skills Framework:

<http://www.ncl.ac.uk/quilt/modules/gsf.htm>

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have references to the benchmark statements for (Engineering) (E).

Knowledge and Understanding

On completing the programme students should:

- A1 An advanced knowledge and understanding of the origin of petroleum source rock and of the processes of oil and gas generation in sedimentary basins
- A2 An advanced knowledge and understanding of the processes influencing petroleum migration and trapping
- A3 An advanced knowledge and understanding of the geochemistry of petroleum

reservoirs

A4 An advanced knowledge and understanding of the geochemistry of molecular marker compounds in sediments and crude oils - their uses and limitations

A5 An awareness of the role played by the petroleum geochemist in the oil and gas industries, especially in petroleum systems analysis and appraisals of hydrocarbon prospectively

A6 An understanding of the principles, applications and limitations of the main analytical techniques used in petroleum geochemistry, and an advanced understanding of some of these techniques

A7 An understanding of the theory and practice of microscopy in the study of sedimentary organic matter, and an awareness its value and limitations compared to organic geochemical approaches.

A8 An understanding of Geographic Information systems and their use in data presentation

Teaching and Learning Methods

Specialist knowledge and understanding (A1–A8) are primarily imparted via lecture classes, often supported by computer-hosted reference materials. Knowledge and understanding in each of these areas are further promoted by workshops covering problem solving and modelling (A1–A6, A8), field trips (including a residential field course in the Wessex Basin; A1–A7), practical classes (A6–A7), and case studies (e.g. Wessex Basin; A1–A7). Throughout the taught component of the course, students are encouraged and expected to engage in independent reading, and are supported in this by the provision of individual module reading lists. Short multiple choice tests at the end of each module (“ten minute tests”) enable students to monitor the progress of their learning. Active participation in problem solving and modelling workshops (A1–A6, A8), field course exercises and discussions (A1–A8), practical classes (A6–A8), and reflection on case studies (A1–A8) all aid the development of understanding.

Assessment Strategy

Knowledge and understanding (A1–A8) are assessed by a combination of 7 unseen written module examination papers and 13 coursework exercises. Both employ a range of approaches in order to assess accurately student abilities. Written papers include variously essay, calculation, data interpretation and multi-part questions; assessed coursework comprises a laboratory report, essays, data interpretation exercises, field-based course work and the production of PowerPoint presentations. Some, or all, of A1–A8 (depending on topic) are also examined by the means of a dissertation and short oral dissertation presentation and possibly (at the discretion of an External Examiner) by viva voce examination.

Intellectual Skills

On completing the programme students should be able to:

B1 Critically assess the quality of data generated by analytical geochemical techniques.

B2 Present and summarise such data in graphical and tabular form, and critically appraise its significance, using appropriate statistical techniques where applicable.

B3 Evaluate critically current research

B4 Formulate or recognise key hypotheses, to test hypotheses using logical and consistent quantitative or qualitative arguments, and to identify key data which allow such tests to be made.

B5 Evaluate current methodologies and develop critiques of them

B6 Solve relevant logical and numerical problems.

Teaching and Learning Methods

Skills B1 and B2 are developed during the practical classes. Intellectual skills B3–B6 are addressed in the many problem solving and modelling workshops throughout the programmes especially the exercises during the field trip which involves students collating, interpreting and integrating (often conflicting) data and observations, and thus further develop

these skills. Attendance at School and external (e.g. University of Durham CeREES) seminars in Semester 2 provides an additional opportunity to acquire skills B3–B5, and all intellectual skills (B1–B6) are exercised significantly during the course of the individual project. Following their initial introduction in lecture classes, students are encouraged to acquire intellectual skills B1 and B2 in the laboratory practical classes and workshops of modules, by the analysis, interpretation and presentation of data, some of which they have generated themselves. Active participation in the problem solving workshops of succeeding modules promotes the development of skills B3–B6. Students are also expected to acquire cognitive skills by simulating aspects of petroleum systems using simple computer models (B3–B5), by participation in, and reflection on, the field course exercises (B1–B6), and by discussion of scientific presentations following School seminars (B3–B5). The interpretative and discursive aspects of the dissertation project encourage the further development of cognitive skills B1–B6, but at a more advanced academic level.

Assessment Strategy

Intellectual skills (B1–B6) are assessed by means of coursework (a laboratory report, essays, data interpretation exercises, field-based course work and the production of PowerPoint presentations), and unseen written examinations. Some, or all, of B1–B6 (depending on topic) are also examined by means of a dissertation (CEG8699 or CEG8697) and short dissertation presentation (CEG8699 only), and possibly (at the discretion of the External Examiner) by viva voce examination.

Practical Skills

On completing the programme students should be able to:

C1 Understand the principles, applications and limitations of the main analytical techniques used in petroleum geochemistry (with an advanced understanding of some of these techniques).

C2 Have acquired practical experience of a range of modern organic geochemical techniques, and advanced experience of some of these techniques.

C3 Be able to critically assess the quality of the analytical data generated by these Techniques.

C4 Be able to present and summarise such data in graphical and tabular form, and to critically appraise their significance, using appropriate statistical techniques.

C5 Plan, execute and present a research project

C6 Produce GIS maps using ARCGIS modelling software

Teaching and Learning Methods

Understanding (C1, C2) and experience or demonstration of the main organic geochemical and optical techniques used in petroleum geochemistry are primarily provided by the lectures and practical classes,

Interpretation of the significance of the data generated, and its quality and presentation (C3, C4) are also taught in these laboratory and lecture classes. Problem-solving exercises during the residential field and in related lectures help students acquire the ability to integrate diverse geochemical and geological data sets. The Research Methods module further addresses C3, C4 and C5, whilst more advanced training in some, or all, of skills C1–C5, is provided on an individual basis during the summer during which students commonly work within one of the existing CEG geochemistry research groups. Students are encouraged to acquire practical skills C1–C2 through hands-on participation in the organic geochemical and optical practical classes, and by active participation in data interpretation workshops (C3–C4). Completion of exercises during the residential field course and associated modules provides a further opportunity for students to acquire an appreciation of the significance and quality of geochemical data (C3–C4). Learning is reinforced, and further developed, as students apply their new skills to the analysis of sedimentary organic matter, and to the appraisal and presentation of the resulting data, in their dissertation projects (some or all of C1–C5, C6)

Assessment Strategy

Subject-specific and practical skills (C1–C4) are assessed by means of 13 coursework reports and by 7 unseen written examinations. Some, or all, of C1–C4, C6 (depending on topic) are also examined by means of a dissertation and short dissertation presentation and possibly (at the discretion of an External Examiner) by viva voce examination.

Transferable/Key Skills

On completing the programme students should be able to:

- D1 Effectively communicate with specialist and non specialist audiences
- D2 Retrieve information from literature/databases and manipulate and present data in a variety of ways
- D3 Efficiently use general IT skills
- D4 To plan, organise and prioritise work activities in order to meet deadlines
- D5 Exercise initiative and personal responsibility
- D6 To solve problems
- D7 Work effectively as a part of a team

Teaching and Learning Methods

Key skills D1–D4 are taught formally in CEG8601 (Research Methods). Management of workload in order to meet deadlines (D4) is also promoted by means of a strict coursework timetable, whilst team working skills (D7) are developed by group exercises. These also provide opportunities for students to improve their problem solving abilities (D6), and to extend their communication, library, IT, and time management skills (D1–D4). The summer dissertation project provides students with further opportunities to develop all of these skills (D1–D7). Students are encouraged to acquire key skills D1–D4 through reflection on the material provided.

Assessment Strategy

Key skills (D1–D4) are assessed via written examinations, the production of a research brief (CEG8601), and the preparation and delivery of a short presentation on their dissertation work (CEG8699 only). Communication (D1), library (D2) and IT (D3) skills, and the ability to meet deadlines (D4) work independently (D5) and solve problems (D6) are indirectly assessed by other coursework items (a laboratory report, essays, data interpretation exercises, field-based course work and the production of PowerPoint presentations), and all key skills (D1–D6) are examined by means of a dissertation (CEG8699 or CEG8697) and short dissertation presentation (CEG8699 only), and possibly (at the discretion of an External Examiner) by viva voce examination.

12 Programme Curriculum, Structure and Features**Basic structure of the programme**

Basic structure of the programme:

- (a) When taken full-time the MSc is a one-year programme (late September to early September). The Postgraduate Diploma (PgD) is a shorter programme running from late September to late May.
- (b) Stages are not applicable; a formal progression separates the MSc taught course and the dissertation project (CEG8699).
- (c) The MSc comprises 180 credits: twelve, 120-credit, taught modules running from late September until Easter, and a 60-credit individual dissertation project (CEG8699) leading to submission of a dissertation in mid-August.
- (d) There are no optional modules. This is because the MSc course imparts significant new knowledge that is not covered in any undergraduate qualification, and our students have a variety of backgrounds (although usually either geologists or chemists). Everything that is taught is considered to be essential to a rounded understanding of the subject. The level of student numbers also means that options would be an ineffective use of staff time.

Individual specialisation is possible within the dissertation module (CEG8699 or CEG8697).

Key features of the programme (including what makes the programme distinctive)

The taught component of the MSc course consists of twelve 10-credit compulsory modules: one Research Methods module (CEG8601) and eleven modules that address the subject-specific aspects of the programme: CEG8632 and CEG8633 (Sedimentary Organic Matter 1 and 2), CEG8623 (Maturation and the Generation of Oil and Gas), CEG8621 (Molecular Marker Compounds), CEG8624 (Migration and Reservoir Geochemistry), CEG8626 (Petroleum and the Environment), CEG8625 (Chemical Analysis of Organic Matter), CEG8627 (Geology of the Wessex Basin), CEG8628 (Petroleum Systems Analysis of the Wessex Basin), CEG8629 (Petroleum Systems Analysis) and CEG8705 (Introduction to GIS). Each 10-credit module equates to 100 hours of learning time. A characteristic feature is that all but one of the technical modules are taught in short (generally two-week) blocks. These occupy students full-time until the module has been completed, and students then progress to the next module. This structure enhances student learning by allowing later units to build on the concepts, knowledge and skills acquired in earlier modules. There is a formal progression step requiring that the taught course is passed before MSc students are allowed to proceed to the CEG8699 Dissertation Project (3.5 months, 600 hours).

(a) There are no formal industrial placements or overseas study periods; however, some dissertation work may be partly or wholly done at another academic or industrial institution provided appropriate supervisory and support arrangements are possible. Apart from the one week Wessex Basin trip (CEG8627) any additional fieldwork usually only involves short sampling trips (e.g. day trips to local UK outcrop areas).

(b) As all modules are compulsory there are no alternate pathways through the MSc course. For those who enrol part time (residential), the taught course modules can be taken in appropriate blocks of time spread over up to three years in combinations that ensure any prerequisite knowledge required for each module has been gained.

(c) Accreditation

Joint Board of Moderators <http://www.jbm.org.uk/> for intakes up to 2015.

Geological Society of London accreditation.

<http://www.geolsoc.org.uk/gsl/null/lang/en/page728.html>.

(d) This is the only dedicated Petroleum Geochemistry MSc course available in the UK or elsewhere.

Teaching styles change through the course in order to help students adjust and adapt to the self-management and independent learning expected outside academia. The initial taught course modules impart knowledge and information through formally taught lectures and practical classes; however, in Semester 2, modules CEG8627, CEG8628, and CEG8629 introduce a case-study teaching style, with students being required to take a more active role in their own learning, but with a greater element of teamwork. This is designed to assist them in their transition to independent (but directed) learning during the dissertation project (CEG8699 or CEG8697).

The CEG8699 MSc dissertation projects are often laboratory based but may also involve desk or literature studies, or modelling work. Students are provided with a wide range of potential projects and asked to express their preferences; we then allocate projects based on these preferences and staff supervisory loads. The shorter CEG8697 PgD dissertation project involves less practical work and this places greater emphasis on literature work and data interpretation. During the project, MSc students are usually based in the School, often working alongside PhD students and post-doctoral research associates in one of our established research groups.

Programme regulations (link to on-line version)

<http://www.ncl.ac.uk/regulations/programme/>

13 Criteria for admission

Entry qualifications

A minimum of a second-class Honours degree, or an international equivalent, in an engineering, science or related subject.

Admissions policy/selection tools

Upon receipt of a completed application form via the electronic E2R system, eligible and suitably qualified candidates are made automatic conditional or unconditional offers of places by the PG Admissions team in Kings Gate. Overseas qualifications are assessed by the PG Admissions team in Kings Gate using the database set up by the international office, supported also by NARIC <http://www.naric.org.uk/>. Where uncertainty exists applications are referred to the Degree Programme Director (DPD). The DPD invites all UK-based applicants to visit the School for an introduction to the Programme and tour of our facilities. Applicants not based in the UK are not required to attend an interview. Decisions are based on qualifications, references, any relevant work experience, and the applicants' personal statements.

Non-standard Entry Requirements

Candidates without the typical qualifications will be considered, especially those with relevant professional experience, but there is no Diploma entry route.

Additional Requirements

Level of English Language capability

IELTS 6.5 (or equivalent) with at least 6 in each component.

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: <https://my.ncl.ac.uk/students/>

Induction

During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support

Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

Academic support

The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support

All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities

The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources

The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-session language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15 Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews

All modules are subject to review by questionnaires which are considered by the Board of Studies (BoS). Changes to, or the introduction of new, modules are considered at the BoS and/or the School Learning, Teaching and Student Experience Committee (SLTSEC). Student opinion is sought at the Staff-Student Committee (SSC) and/or the BoS. New modules and major changes to existing modules are subject to approval by the Faculty Learning, Teaching and Student Experience Committee (FLTSEC).

Programme reviews

The BoS conducts an Annual Monitoring and Review of the degree programme and reports to FLTSEC. The FLTSEC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Learning, Teaching and Student Experience Committee (ULTSEC).

External Examiner reports

External Examiner reports are considered by the BoS. The Board responds to these reports through FLTSEC. External Examiner reports are shared with institutional student representatives, through the SSC.

Student evaluations

All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the SSC, and the BoS. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback

Feedback is channelled via the SSC and the BoS.

Faculty and University Review Mechanisms

The programme is subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by ULTSEC on whether the programmes reviewed should be re-approved for a further five year period.

Accreditation reports

At the date of publication, the continuation of accreditation by the Joint Board of Moderators (Institution of Civil Engineers, Institution of Structural Engineers, Chartered Institution of Highways and Transportation, and the Institute of Highway Incorporated Engineers) as meeting the requirements for Further Learning for a Chartered Engineer (CEng) for candidates who have already acquired an Accredited CEng (Partial) BEng (Hons) or an Accredited IEng (Full) BEng/BSc (Hons) undergraduate first degree, is pending final approval (July2012). See www.jbm.org.uk for further information.

The programme is also accredited for learning towards Chartered Geologist status by the Geological Society. It is reviewed every 5 years by a sub-panel of the Geological Society executive. The results and feedback from the panel are considered by the Board of Studies.

Additional mechanisms

16 Regulation of assessment

Pass mark

The pass mark is 50%

Course requirements

Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. Limited compensation up to 20 credits of the taught element and down to a mark of 40% is possible and there are reassessment opportunities, with certain restrictions.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

Summary description applicable to postgraduate Masters programmes

<50	Fail
50-59	Pass
60-69	Pass with Merit
70 or above	Pass with Distinction

Role of the External Examiner

An External Examiner, a distinguished member of the subject community, is appointed by FLTSEC, following recommendation from the BoS. The External Examiner is expected to:

- i. See and approve assessment papers
- ii. Moderate examination and coursework marking
- iii. Attend the Board of Examiners
- iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus: <http://www.ncl.ac.uk/postgraduate/>

The School Website: <http://www.ncl.ac.uk/ceg/study/postgraduate/taught/index.htm>

Degree Programme and University Regulations: <http://www.ncl.ac.uk/regulations/docs/>

The School Handbook: <https://ce-gs14.ncl.ac.uk/CeG.Internal/teaching/handbooks/2011-2012/CeG%20School%20Handbook.PDF>

The Degree Programme Handbook: <https://ce-gs14.ncl.ac.uk/CeG.Internal/teaching/handbooks/2011-2012/EE%20Handbook.pdf>

The Module Catalogue: <http://www.ncl.ac.uk/module-catalogue/>

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Module	Type	Intended Learning Outcomes			
		A	B	C	D
CEG8601	Compulsory		1,2,3,4,5,6	3,4	1,2,3,4,5,6
CEG8621	Compulsory	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4	1,2,3,4,5,6
CEG8632	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6	1,2,3,4	1,2,3,4,5,6
CEG8633	Compulsory	1,2,3,4,5,6	1,2,3,4,5,6		1,2,3,4,5,6
CEG8624	Compulsory	1,2,3,4,5,6	1,2,3,4,5,6	1,3	1,2,3,4,5,6
CEG8625	Compulsory	6,7	1,2,3,4,5,6	1,2,3,4	1,2,3,4,5,6,7
CEG8626	Compulsory	1,6	1,2,3,4,5,6		1,2,3,4,5,6
CEG8627	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6	3,4	1,2,3,4,5,6,7
CEG8628	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6	3,4	1,2,3,4,5,6,7
CEG8629	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6	3,4	1,2,3,4,5,6
CEG8705	Compulsory	1	1,2,4,5,6	3,4,5,6	1,2,3,4,5,6
CEG8699	Compulsory	1,2,3,4,5,6,7	1,2,3,4,5,6	1,2,3,4	1,2,3,4,5,6,7