

**Response to JBM:****Incorporating Health & Safety Risk Management into the Curriculum****Degree Programmes:****MEng/BEng in Civil Engineering****MEng/BEng in Civil Engineering with Architecture****General**

In what follows, the Department has taken account of the guidelines set out in Annex D of *Guidelines for Accredited MEng Degree Programmes leading to Chartered Engineer: Health and Safety Risk Management in Degree Programmes*. The Department has set out to enhance the role of H&S risk management by integrating the topic into the degree programmes, thereby establishing a thread of H&S Risk Management from Year 1 to Year 5.

The principal change is the integration of H&S risk management into our existing thread of design projects which run from Year 1 to Year 5 (including case studies). This will enhance our current contributions such as the Learning from Disasters exercise in Year 1 and a series of lectures in Civil Engineering Administration 2 which deals specifically with H&S issues in construction (see attached syllabus). It is also the case that, from Year 2 onwards, the principles of limit state design, partial factors, and the trade-off between risk, safety and cost are highlighted both in formal lecture courses (e.g., Structural Engineering 2 and Geotechnical Engineering 3) and in the design projects.

There will also be assessed exercises in Risk Management which are related to the students' experience, e.g., surveying work during the annual Survey Camp and site visits.

Further details of what is done in each year of the degree programmes with respect to Health and Safety Risk Management is given in the following paragraphs.

## Year 1

*Learning from Disasters* – a major group exercise over one week in which the students have to report on the technical and human factors which may have led to the failure. They also have to consider the importance of good design, good management and good communications, and invariably this leads them into issues of H&S Risk Management. This aspect of the exercise is reinforced by input from a member of staff from the local H&S office, who is involved in the formal consultations with each group and in the final presentations. Each group of 4 students focuses on two disasters, but also listens to presentations from other groups on other disasters and participates in subsequent discussion. Over 30 disasters are covered in total, including topics such as Fire (Summerland, 1973), Landslip (Vaiont Dam, 1963), Contamination (Camelford, 1988) Flooding (Boscastle, 2004) and Progressive Collapse (Ronan Point, 1968). (Assessment component - 40% of 10 credit course).

*Lectures* – we have invited a speaker from the local H&S office to provide an introduction to risk assessment methodology. The students will be required to submit a summary of the lecture and a method statement and risk assessment of a familiar task. (Assessment component - 5% of 10 credit course).

*Design Projects 1* – incorporate, where possible, issues such as safety, risk and hazard; types of risk (natural and man-made); system design (organisational and management issues); relationship between cost/benefit and risk/safety. Student submissions will include an identifiable element of H&S risk management which contributes to the overall grade achieved. (Small assessment component).

## Year 2

*Surveying 2* - As part of the formal assessment procedure for the annual survey camp, students will be required to submit a risk assessment based on their own experience of the camp. (Assessment component - 5% of 10 credit course)

*CE Admin 2* – See attached syllabus for H&S topics. (Assessment component - 20% of 10 credit course).

*Design Projects 2* – incorporate, where possible, issues such as safety, risk and hazard; types of risk (natural and man-made); system design (organisational and management issues); relationship between cost/benefit and risk/safety. Student submissions will include an identifiable element of H&S risk management which contributes to the overall grade achieved. A major part of Design Projects 2 consists of a flood risk assessment of a river valley in Cheshire; a second part deals with simple slope stability analysis of a dam, including considerations of safety, risks and consequences. (Assessment component - 25% of 20 credit course).

### Year 3

*Design Projects 3* – incorporate, where possible, issues such as safety, risk and hazard; types of risk (natural and man-made); system design (organisational and management issues); relationship between cost/benefit and risk/safety. Student submissions will include an identifiable element of H&S risk management which contributes to the overall grade achieved. Design Projects 3 includes a combined slope stability/excavation/retaining wall design, and the students must report on not only the analysis but the construction sequence and H&S issues arising from it. (Assessment component - 5% of 20 credit course).

### Year 4

*Planning and Estimating 4* – includes a site visit and report, which will be assessed. (Assessment component - 5% of 10 credit course).

*Design Projects 4* – This consists of two major design projects: a 25m span simply supported bridge using pretensioned beams with an insitu slab and a statically indeterminate frame for a warehouse loading bay. Reports on both projects will include a section on the H&S issues associated with fabrication and construction. (Assessment component - 10% of 10 credit course).

### Year 5

*Case Studies* – Of particular note is Case Study 4, which deals with the failure of Carsington Dam, and takes account of both technical and non-technical factors in the report. The non-technical factors include H&S issues arising from both the design and construction of the dam. (Assessment component - 10% of 10 credit course).

*Electives* – two electives are particularly relevant with respect to risk and cost: River Engineering and Integrated Catchment Modelling, which looks at existing flood risk and future flood risk through climate change. (Unspecified assessment component).

*Industrial Report* – is a report on the vacation work done by the MEng students between Year 4 and Year 5. The students will be required to address issues of H&S risk management from their own experience in the job, and discuss these in the report. (Assessment component - 25% of 10 credit course).

Integrating all of the above elements into the curriculum will help to equip students with the Attitude, Competence and Knowledge referred to in the intended learning outcomes listed in paragraph 4 of Annex D of the JBM guidelines *Health and Safety Risk Management in Degree Programmes*.

## Admin 2 – Safety

### Accidents:

- ~ why they happen, concentrating on **root** causes rather than specific causes;
- ~ how they can be prevented (again, concentrating on root causes rather than specific causes);
- ~ costs associated with accidents;

### Health/Safety and the Law

- ~ Common Law (general safety-related aspects inc. Negligence)
- ~ Statute Law (HSW Act, Construction Regulations, CDM Regulations)
  - ~ general principles and philosophy;
  - ~ specific aspects of legislation (Safety Policy, Safety Officers/Supervisors, Employers' responsibilities; Statutory Examinations/Inspections/Reports; RIDDOR);
  - ~ discussion of effectiveness or otherwise of regulation/legislation (inc. the principle of hierarchical obligation).

### Managing Health and Safety in Construction

- ~ Initial Concept and Design (incl. potential health/safety-related issues regarding maintenance and eventual demolition)
- ~ Contract Documents (discussion of effectiveness or otherwise of including specific safety requirements in the contract documents);
- ~ Selection of Contractors;
- ~ Construction Planning;
- ~ Construction;

**Note: The general ethos of the course centres around discussion and interaction (constantly emphasising the facts that accidents are caused by people rather than processes, that “safety” is a state of mind rather than a matter of regulation/legislation and that “safety” is for everybody, not just Safety Officers and HSE Inspectors) rather than rote-learning of regulations etc.**