# ALTERNATIVE ROUTES TO MEMBERSHIP

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## EXPERIENTIAL ROUTE TO

# ASSOCIATE ENGINEER

## By Experiential Learning

**Engineers Ireland**
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# 1. INTRODUCTION

Engineers Ireland, founded in 1835, represents all branches of the engineering profession and categories of engineer in Ireland.

The fundamental aims of Engineers Ireland are:

- to promote knowledge of engineering and of engineering science
- to establish and maintain standards of engineering education and training
- to promote and provide opportunities for continuing professional development for engineers
- to maintain standards of professional ethics and conduct
- to ensure that the Registered Professional Titles of Engineers Ireland are assigned only to appropriately qualified engineers and technicians.

Within Ireland, Engineers Ireland is the authoritative voice of the engineering profession on relevant national issues. It makes submissions and representations to Government and official bodies on national policy for infrastructure, budgets, industry, education and the overall development of the Irish economy.

Engineers Ireland is a signatory to a wide range of international accords and bilateral agreements which enable holders of various grades of membership and Registered Professional Titles to practise in Australia, Canada, Hong Kong - China, New Zealand, South Africa, the United Kingdom, the United States and all member states of the European Union.

## 2. THE ASSOCIATE ENGINEER

### 2.1 Definition Of An Associate Engineer

The Associated Engineer is competent to apply in a responsible manner current engineering technologies in a chosen field. He/she exercises independent technical judgement and works with significant autonomy within his/her allocated responsibility. The performance of his/her engineering work requires an understanding of relevant financial, commercial, statutory, safety, management, social and environmental considerations.

### 2.2 Formation Of An Associate Engineer

The formation of an Associate Engineer normally consists of an approved engineering diploma, such as the National or Technician Diploma in Engineering or an approved Engineering Technology or Science degree followed by a number of years* of appropriate experience in the workplace.

During the programme, the student will gain skills and knowledge in the engineering sciences which underpin the chosen are of technology together with an understanding of mathematics to an appropriate level. As the programme is primarily focused on technology, the student will study a range of the current technologies appropriate to the discipline of engineering chosen. During the engineering technologist's initial years of employment, he/she will develop the necessary competences associated with the application of what he/she learned in college, to the solution of technology problems. Only when the individual can demonstrate that he/she has acquired such competences may his/her formation as an Associate Engineer be regarded as meeting the standards prescribed by Engineers Ireland.

* Three years for four-year degree graduates and four years for three-year diploma/degree graduates

### 2.3 The Competences Of An Associate Engineer

A graduate of an accredited engineering technology degree or diploma programme will be able to demonstrate the skills, knowledge and understanding associated with the Programme Outcomes in Part 2 of Engineers Irelands' publication *"Accreditation of Engineering Education Programmes"*. The requirements that holders of such accredited programmes must meet in order to succeed in the professional review leading to the title "Associate Engineer", are described in Engineers Ireland's publication "Regulations for the title Associate Engineer". The competences required are reproduced here in Appendix A.

## 3. ACQUIRING THE COMPETENCES BY EXPERIENTIAL LEARNING

**3.1** Engineers Ireland recognises that the development of engineering technology competences can take place in a wide range of settings. These include educational institutions and the engineering workplace. Furthermore, individuals with a personal interest in and enthusiasm for engineering technology may study engineering technology and attend various training courses throughout their career. Such individuals may be functioning as engineering technologists in the workplace.

**3.2** Engineers Ireland considers that such engineering technologists, provided they succeed in the examination process described here, should be included in the membership of Engineers Ireland and granted the title of Associate Engineer. As these engineering technologists do not hold accredited engineering technology diplomas or degrees, an alternative approach is required when evaluating whether they meet the requirements by which Engineers Ireland must abide when considering such applications.

**3.3** It should be understood that not all candidates will have all the competences. It is a matter for the Examiners to determine if they are satisfied with a particular candidate's overall performance, to recommend that the candidate should be granted the title Associate Engineer.

**3.4** The Experiential Learning Procedure has been formulated for those who do not have formal academic qualifications at the required level but who, over an extensive number of years may have developed the competences of an Associate Engineer. This they will have achieved in one or more of the following ways:

**3.4.1** Participating in various educational and training programmes related to engineering technology.

**3.4.2** Working with Associate Engineers on engineering technology projects and involvement in project design and implementation.

**3.4.3** Executing engineering technology projects of increasing complexity over a period of years.

**3.4.4** Researching engineering literature and reports in order to find solutions to engineering technology problems.

**3.4.5** Functioning as a '*de facto*' Associate Engineer on a range of projects exploring and covering the generality of a particular engineering technology discipline

## 4. LEARNING THROUGH EXPERIENCE THE COMPETENCES OF AN ASSOCIATE ENGINEER

**4.1** It is easier to quantify experience than it is to measure learning. Experience is an input and learning is an output. Unfortunately there is no guarantee that "X" amount of experience will yield "X" amount of learning. The variables are numerous, including both the qualities of the learner and the quality and duration of the experience.

If an individual is eager to learn, he/she can absorb knowledge, acquire skills and develop new perspectives and insights. On the other hand, an individual who is uninterested or has difficulty learning, may spend years employed in an engineering technology setting paying little attention to the learning potential of his/her working environment and learning little.

**4.2** The common complaint about those who have learned only from experience is that they can "do" (in a particular setting), but cannot "explain". This is because they may not fully understand the engineering principles that would allow them to apply their learning in new settings or to discuss the concepts embodying these principles in an analytical way.

In addition to an appropriate balance between theory and practice, the learner, through reflection, needs to know why both are necessary and how each extends the value of the other.

**4.3** In order to succeed, the candidate must successfully demonstrate to Engineers Ireland that he/she:

a) Has acquired the competences of an Associate Engineer

b) Has an appropriate depth and balance of knowledge between theory and practice so that the interplay between the two is strategically effective.

c) Has the breadth of understanding of the Associate Engineer's competences such that he/she can apply these in a wide range of diverse settings.

## 5. APPLICATION REQUIREMENTS

**5.1** Applicants following this Procedure require no formal academic qualifications.

**5.2** Engineers Ireland considers that the acquisition by an applicant of the competences of an Associate Engineer by experiential learning would require a 10-year period of working in appropriate engineering settings. In exceptional circumstances an applicant might achieve these competences in a shorter period, especially if the applicant has successfully completed engineering technology education or training programmes.

## 6. APPLICATION PROCEDURE

**6.1** The process is initiated by the applicant completing an "Alternative Routes to Assessment Form", the primary purpose of which is to enable the Membership and Qualifications Board to determine the most appropriate grade of membership/title and/or the process to be followed by the applicant.

**6.2** If the Board agrees that the applicant should apply for the title of Associate Engineer through the Experiential Learning Procedure the candidate will be invited to produce a portfolio describing past learning and achievements to date.

**6.3** The portfolio will consist of two sections:

(a) Report on Experiential Learning (Section 8)
(b) Report on an Engineering Project (Section 9)

**6.4** The Board of Examiners, through the Registrar, will assign a mentor to each candidate. The role of the mentor is to provide candidates with an understanding of how to construct the portfolio.

**6.5** The completed portfolio, when submitted to Engineers Ireland by the applicant, will be referred to Examiners (Section 10), appointed by the Board of Examiners. The task of the Examiners is to evaluate the candidate's competences as presented in the portfolio and the extent to which these meet the competences listed in Appendix A.

**6.6** The Examination will consist of:

(a) A formal presentation of the portfolio by the candidate to the Examiners, at the beginning of the oral examination.

(b) An oral examination (Section 11), during which any aspect of the portfolio may require clarification or elucidation by the Examiners

**6.7** The Examiners are required to satisfy themselves that the candidate has reached an acceptable level in the competences described in Appendix A. Due consideration will be given to the diversity of settings in which candidates may have developed their competences. The Examiners in the interpretation of the content of the portfolio will exercise flexibility. Examiners will not expect candidates to have all the competences listed. The set of competences listed represents the ideal profile of an Associate Engineer. It is a matter for the Examiners to exercise careful judgement in reaching a recommendation.

## 7. THE ROLE OF THE MENTOR

**7.1** The role of the mentor is confined to assisting the candidate in

(a) understanding the meaning of the competences described in Appendix A
and
(b) accurately identifying and describing his/her skills and knowledge insofar as these relate to the competences.

**7.2** The mentor's role does not in any way extend to enhancing the quality of the candidate's skills and knowledge beyond assisting the candidate as described above.

**7.3** The mentor has no role or influence in the examination of the candidate and cannot be held responsible in any way for the outcome of the examination.

## 8. REPORT ON EXPERIENTIAL LEARNING (SEE ALSO APPENDIX B)

**8.1** This section of the portfolio is an extended engineering practice report (8,000 to 10,000 words) which should give details of education, training and work experience in a clear, uniform format as described in Appendix B.

**8.2** The appointed mentor will first discuss with and explain to the candidate, the competences listed in Appendix A.

**8.3** Information should be provided in relation to the experiential learning gained by the candidate, relating this, in each case, to a competence. Particular care should be taken to use concise language (See Appendix C) so that only experiential learning is being described and not simply experience.

**8.4** A competence may be a simple or compound statement and the response to it should be structured accordingly. Each response should start with a statement of experiential learning achieved, which should be supported by

specific examples of how the candidate's learning meets the competence criteria.

**8.5** In describing his/her learning, the candidate should demonstrate not only knowledge or skills but also understanding of the engineering principles upon which these are based.

**8.6** The candidate must demonstrate that he/she can apply his/her engineering technology competences in a wide range of settings and not just within the confines of a specialised sector of engineering.

**8.7** Information on the extent and character of the **personal contribution** and level of responsibility exercised by the candidate and where possible, some quantified measure of impact e.g. budget, level of risk, loss implications, etc. should be included. This is intended to assist the Examiners in making an assessment of the candidate and reaching a judgement on the level of competence and personal responsibility exercised.

**8.8** Specific information relating to **personal responsibility** within each employing organisation must be included as well as details of significant technical or managerial problem solving and innovative activity. The scope for freedom of action available to the candidate and conversely the nature of constraints imposed will be of interest.

**8.9** The candidate must provide a Letter of Certification from each employer which verifies the accuracy of learning being claimed. Other evidence such as reports, publications, photographs and software may also be provided.

**8.10** The completed Report should be bound into the portfolio.

## 9. REPORT ON AN ENGINEERING TECHNOLOGY PROJECT (SEE ALSO APPENDIX B)

**9.1** The candidate is required to produce a written report (3000 to 5000 words) on an engineering technology project he/she has successfully undertaken during the 5 years immediately prior to the submission of this application to Engineers Ireland.

**9.2** The nature of the project described in the report should be such as to support the candidate's claim in respect of competences achieved by experiential learning and described in the Experiential Learning Report.

**9.3** The completed Report should be bound into the portfolio.

## 10. THE EXAMINERS

**10.1** The Board of Examiners will appoint three Examiners who are Chartered Engineers and members of Engineers Ireland. These will be selected as follows:

- Two Chartered Engineers with experience in an area of engineering cognate to that of the candidate's.

- A current or former academic member of staff of a university or institute of technology offering one or more honours engineering degree programmes accredited by Engineers Ireland.

**10.2** All three Examiners are required to be competent within the candidate's field of specialisation and to have an understanding of the assessment of learning.

**10.3** The Board of Examiners, through the Registrar, shall appoint the Chairman.

**10.4** The duties of the Examiners are to evaluate the portfolio and other relevant aspects of the application of the candidate as specified in this document and to make a recommendation in respect of the candidate to the Membership and Qualifications Board.

**10.5** The recommendation of the Examiners in respect of each candidate is submitted to the Membership and Qualifications Board of Engineers Ireland, whose decision in respect of each application, is final.

**10.6** All members of the Membership and Qualifications Board and Examiners are bound by the Council of Engineers Ireland to maintain complete confidentiality with regard to proprietary or commercially sensitive information relating to a candidate's work or the activities of his/her employing organisation.

## 11. THE ORAL EXAMINATION

**11.1** The Examiners will conduct an oral examination with the candidate, based on the content of the portfolio.

**11.2** The fundamental purpose of the Examination is to evaluate the candidate's understanding of what has been presented in the portfolio and his/her overall engineering technology competences.

**11.3** The Examination will normally extend over a period of at least 2 hours and will commence with the candidate being invited to give a verbal summary (maximum 20 minutes) of the portfolio content. This must highlight the experiential learning being claimed by the candidate.

**11.4** The Examiners may discuss with and question the candidate about any aspect of the portfolio or oral presentation. This can include the relevant underlying scientific and engineering principles, knowledge of design codes and practice, technical aspects, environmental, safety, management and other issues considered relevant to the candidate's engineering technology specialisation.

**11.5** The Examination will be conducted in a formal way and an extensive range of topics will be covered relating to the learning claimed and other appropriate areas.

**11.6** At the end of the Examination the candidate will be given an opportunity to make a brief reference to any aspect of his/her portfolio that he/she feels is important and that has not been adequately explored during the examination.

**11.7** The Examiners will submit their recommendation in respect of the Examination to the Membership and Qualification Board.

## 12. SUPPORTERS

**12.1** Each candidate is required to have his/her application supported by two Chartered Engineers familiar with his/her work as an engineering technologist.

**12.2** Each supporter should be familiar with the regulations for the Experiential Learning Procedure (this document). He/she should also be prepared to support the application by completing the appropriate documentation confirming that the applicant is, in the supporter's considered view, a candidate who merits consideration for the award of the title Associate Engineer.

## 13. APPLICATION FEE

Engineers Ireland will charge a fee, designed to recover its costs and expenses.

## 14. DURATION OF PROCEDURE

**14.1** The candidate will be expected to complete and submit the portfolio within one calendar year of receiving confirmation from Engineers Ireland that he/she may proceed with its preparation.

**14.2** Examiners will normally require about one month to evaluate the portfolio and prepare for the Examination of the candidate.

**14.3** The candidate will be given at least two weeks' notice of the date of the Examination at which he/she will be required to present the portfolio, answer questions about it and discuss its content.

**14.4** Engineers Ireland will communicate its decision to the candidate following the meeting of the Membership and Qualifications Board when the recommendation of the Examiners has been considered.

## APPENDIX A

### THE COMPETENCES OF AN ASSOCIATE ENGINEER

Six Competences of an Associate Engineer are listed and analysed in terms of the range of abilities normally associated with each one.

## Competence 1

## Exercise independent technical judgement at an appropriate level.

*This includes the ability to*:

- Develop, review and select techniques, procedures and methods to undertake tasks
- Apply appropriate scientific and engineering principles
- Undertake a significant role in the achievement of technological tasks

## Competence 2

## Assume responsibility, as an individual or as a member of a team, for the management or resources and/or guidance or technical staff.

*This includes the ability to*:

- Identify and specify resource requirements
- Plan and co-ordinate activities against objectives
- Assist in the preparation and control of budgets
- Monitor and control performance against agreed targets (criteria)
- Manage change
- Exhibit leadership in the working environment supporting team members and managing work groups and projects.

## Competence 3
## Design, develop, manufacture, commission, operate and maintain products, equipment, processes and services

*This includes the ability to*:

- Identify problems
- Formulate solutions
- Evaluate options, considering cost, safety, quality, reliability, appearance and environmental impact.
- Prepare and implement plans.
- Evaluate results

## Competence 4

## Actively participate in financial, statutory and commercial considerations and in the creation of cost effective systems and procedures.

*This includes an ability to:*

- Operate within the financial and commercial constraints of an organisation and the overall statutory framework.
- Contribute to the design and development of systems and procedures.
- Assist in the identification of costs and benefits.
- Monitor and assess operation against criteria.
- Assist in the evaluation of criteria.

## Competence 5
## Use effective communication skills and actively participate in human and industrial relations.

*This includes an ability to:*

- Use oral, written and electronic methods for the communication of technical and other information.
- Utilise people management skills

## Competence 6
## Make a personal commitment to live by the appropriate code of professional conduct which recognises obligations to society, the profession and the environment.

*In order to achieve this commitment they must:*

- Comply with the Code of Ethics of Engineers Ireland
- Manage and apply safe systems of work.
- Undertake their engineering work in compliance with the Codes of Practice on Risk and the Environment.
- Carry out the continuing professional development necessary to ensure competence in their areas of future interested practice.
- Support new entrants to the profession in their initial and continuing professional development.

## APPENDIX B

## FORMAT OF PORTFOLIO FOR EXPERIENTIAL LEARNING PROCEDURE

**1.** The portfolio consists of two parts:

(a) Report on Experiential Learning

(b) Report on an Engineering Project

**2.** The purpose of the portfolio is to provide the Examiners with a description of the learning gained by the candidate from experience of working in an engineering environment, so as to enable the Examiners to evaluate the extent to which the candidate has achieved the competences of an Associate Engineer. It is also an important opportunity for candidates to demonstrate their ability to communicate clearly in writing.

**3. Report on Experiential Learning**

(a) The Report on Experiential Learning must be prefaced by a tabular **Summary of Career Details**, in chronological order, sequentially numbered and including the following in relation to each position held:

- name of employing company/organisation
- title(s) of position(s) held/degree of responsibility
- reporting relationship(s) stating in detail position, qualifications and professional membership of superior(s)
- duration of each phase of training and experience

(b) The Report on Experiential Learning must also include, separately and in chronological order, an outline of the training undertaken by the candidate as set out in the Summary of Career Details. It should identify clearly and separately:

- formal education and training programmes
- job-related courses
- Continuing Professional Development (CPD) activities

In relation to each education programme, training programme, job-related course, CPD activity and each item of engineering experience, the Experiential Learning Report must list the engineering competences learned by the candidate using the learning descriptors in Appendix C, covering the issues described in Section 8 of this document and relating the learning gained to the competences of an Associate Engineer described in Appendix A.

(c) The Report should be not less than 8,000 and not more than 10,000 words in length. The candidate should indicate the actual number of words.

## 4. Report on an Engineering Project

The Report on an Engineering Project should be 3000-5000 words in length. The actual number of words should be indicated by the candidate.

## 5. General

(a) All three sections of the portfolio must be typed or printed and bound into one volume. The minimum font size must be 12 point.

(b) Presentation is an important feature of the portfolio. The form and layout of the portfolio must facilitate examination. The candidate should avoid excessive use of jargon, acronyms, shorthand terms, etc. A glossary of terms is essential. The first use of a term or title in the portfolio which is subsequently abbreviated must be given in full with its acronym. Spelling, grammar and syntax are clearly important. Pages must be numbered. Candidates should provide reasonable spacing between sections. Small drawings, diagrams and/or photographs may be included in an Appendix. Errors and omissions should be avoided by careful editing.

(c) The portfolio must be forwarded in quadruplicate to Engineers Ireland and accompanied by the application fee.

(d) The portfolio must end with the following Statement of Authenticity and be signed and dated by the candidate:

***I hereby certify that the Reports and Essays in this portfolio have been prepared in their entirety by me and that all statements and claims made therein are true and accurate.***

## APPENDIX C

### COMPETENCE DESCRIPTORS

The following table gives examples of some skills and the verbs which may be used to describe specific competences.

| Skills | Active verbs (examples) |
|---|---|
| Recall | Define, List, Identify, Name, State, Recognise |
| Understanding | Explain, Interpret, Predict, Distinguish, Summarise, Justify |
| Application | Analyse, Solve, Calculate, Evaluate, Plan, Devise, Select, Organise |
| Manual Skills | Assemble, Measure, Manipulate, Construct, Use |
| Behavioural Skills | Demonstrate, Communicate, Provide Support, Advise |

In drawing up specific competences it is important to avoid ambiguous language.

| **Avoid Words Like:** | **Use Words Like:** |
|---|---|
| Know | List |
| Understand | Describe |
| Be familiar with | Evaluate |
| Become acquainted with | State |
| Have a good grasp of | Explain |
| Obtain a working knowledge of | Select |
| Appreciate | Identify |
| Realise the significance of | Distinguish |
| Be aware of | Design |
| Believe | Construct |
| Be interested in | Solve |

Although the above list is arranged in pairs of contrasting words or phrases there is no suggestion that the word in the second column is meant to replace the word or phrase in the same row of the first column.