

Registration Requirements for :

**The Institution of Professional Engineers, Samoa
(IPES)**

Summary

This document describes the registration requirements for membership of the Institution, which are the requirements of the IPES Registration Board as per Part II of Professional Engineers Act. Appendix 1 sets out the university degrees, which at present meet Institution requirements, along with the assessment process for other qualified candidates.

Advanced Training

- (a) It takes most graduates some four years of experience to reach a standard suitable for Professional Interview. The Professional Interview panel shall be selected from suitable members of the Institution. This period must include at least 12 months in an “office” (i.e. design and planning) environment, and at least 12 of “works” (i.e. implementation). There must also be at least 12 months in a position of engineering responsibility.
- (b) The Institution can provide guidance on experience through its recommended members. Although graduates are encouraged to join IPES soon after graduation and to take part in general Institution activities, and formal contact IPES training advice is not normally expected until the graduate is into the third year of experience. Earlier contact may be made if there is a specific problem.
- (c) The training advice procedure will provide comment on the progress of graduates and may include a recommendation for a change in the pattern of experience. Where appropriate, graduates will be advised when application for Professional Interview might be made.

Professional Interview

An application for interview is to be made to the Chairman of the Registration Board.

Applicants will be advised whether they have been accepted for the next round of interviews and of the further documentation, which is to be submitted.

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Registration Requirements for IPES

1. Definitions

The following definitions apply in this document:

“The Institution – IPES”	-The Institution of Professional Engineers of Samoa (IPES).
“the Act”	-The Institution of Professional Engineers Act 1998.
“The Board”	-The Engineers Registration Board under The Institution of Professional Engineers Act 1998.
“Corporate Member”	-A member of the Institution in the grade of Member or Fellow
“Professional”	-A person who is a Corporate Member of the Institution or is registered under The Institution of Professional Engineers Act 1998.
“Trainee”	-A person who has commenced a period of study and experience with the object of becoming a professional engineer
“Approved”	-Approved by the Board or a sub-committee or committee of the Board set up, inter alia, for the purpose.
“Recognized”	-Recognized by the Institution of Professional Engineers Samoa (IPES).
“Institution Rules”	- “The Rules of the Institution”
“Examination Requirements”	- Appendix 1
“Trainee at an approved University”	- “undergraduate”

2. Corporate Membership and Registration

The object of the Institution is the advancement of the science and profession of engineering.

Before becoming a Corporate Member of IPES and/or being registered under the Institution of Professional Engineers Act 1998, a person must receive engineering education and advanced training to the standards determined by the Institution and the Professional Engineers Registration Board.

The Institution and the Board are separate entities. However, their representatives’ work together within the committees of the Institution to establish common standards of education and training and the Board normally accepts the standards of the Institution as satisfying its requirements. Examinations and Professional Interviews are conducted by the Institution for membership of the Institution and for Registration if desired. The Institution also conducts examinations and professional interviews on behalf of the Professional Engineers Board for registration only.

3. The Professional Engineer

“Professional Engineers are competent by virtue of their fundamental education and training to apply the scientific method and outlook to the analysis and solution of engineering problems. They are able to assume personal responsibility for the development and application of engineering science and knowledge, notably in research, designing, construction, manufacturing, superintending, managing, and in the education of the engineer. Their work is predominantly intellectual and varied, and not of a routine mental or physical character. It recognizes the exercise of original thought and judgment and the ability to supervise the technical and administrative work of others. Their education will have been such as to make them capable of closely and continuously following progress in their field of engineering science by consulting newly published work on a world-wide basis, assimilating such information and applying it independently. They are thus placed in a position to make contributions to the development of engineering science or its applications.

Their training will have been such that they will have acquired a broad and general appreciation of the engineering sciences and the role that the professional engineer plays within society at large. They will also have developed a thorough insight into the special features of their own fields, so that they will be able to give authoritative technical advice, and to assume responsibility for the direction of important tasks in their branch”.

This basic definition of the professional engineer, which has been adopted by the Institution, is a slightly modified version of the

definition by the engineering societies of New Zealand and Australia.

There are various qualities, which distinguish a professional engineer:

3.1 Training

An engineer will have a broad education in the theoretical aspects and disciplines of engineering as well as training in the practical implementation of engineering projects.

Comment: Although the formal education of an engineer is rooted in scientific knowledge and the scientific method, the theoretical education and subsequent practical training are aimed at the systematic application of this knowledge to the creation of engineering results, structures, systems or products and not merely to scientific analysis.

3.2 Goal of Engineering

An engineer's work is primarily directed toward the design and production of structures, machines, artifacts or systems having function and utility such that material and financial resources are efficiently employed.

Comment: **The emphasis on “design”, “production”, “function”, and “utility” distinguishes engineering from science or art.**

3.3 Analysis/synthesis

An engineer must develop the skills both of analysis (i.e. the resolution of engineering problems into simpler elements) and of synthesis (i.e. the combining, of separate elements into a rational, integrated whole).

Comment: Analysis and synthesis are a necessary mix of skills for many professions. In particular, engineering activity can be distinguished from science by noting:

- The greater emphasis on analysis in science;
- Whether or not the synthesis activity leads directly to production of useful artifacts or systems.

3.4 Competence in design

An engineer is capable of designing or creating products and systems, which are able to be used by others. The results of design may be material or intellectual.

Comment: Design competence is important in the makeup of a professional engineer. It requires as essential components:

- A profound knowledge of technical fundamentals;
- An ability to use methods of analysis, prediction and choice outside those encompassed by standard codes and

procedures to produce effective solutions to engineering problems; and

- Conceptual skills and strong innovative capacity.

3.5 Mature judgment

Professional engineering judgment is the critical faculty used in the making of appropriate decisions within the practitioner's area of competence. It is founded on the exercise of highly developed skills of perception, intuition, discernment, memory and reasoning (including analysis and synthesis).

Comment: The presence of mature judgment is a hallmark of a professional engineer.

3.6 Expertise and experience

A professional engineer will have a high level of expertise in his or her field. Through the exercise of the skills and qualities referred to here the engineer will accumulate a broad experience of the engineering environment in the real world. With experience an engineer develops the ability to respond flexibly to a wide range of engineering situations.

Comment: Experience will shape and develop many aspects of the engineer's personality and will have tested the engineer's competence. If a person has, for a reasonable time, exercised the engineering skills and acquired engineering experience, then this should be evident to engineering peers (e.g.: at Professional Interview). **Persons who have merely acquired engineering knowledge and training without subsequent development and exercise of engineering skills and responsibilities are not professional engineers.**

3.7 Management and communication skills

All professionals achieve results through the exercise of management skills. A professional engineer will achieve good results through effectively managing people, time, money, materials and natural resources. Distinguishing features of engineering management are that engineering judgment and conceptual skills are ingredients of the activity.

The effective engineering manager also has well developed oral and written communication skills. These skills will be exercised in presenting a convincing technical argument or in relating personally to staff.

Comment: The extent to which engineering judgment is used in a management role is a critical test of whether or not a person possessing engineering education and training is practicing engineering.

3.8 Maturity and responsibility

Professional engineers exhibit both personal and professional maturity and understand and take responsibility for the social, economic, environmental, managerial consequences of their decisions and creations.

Comment: The maturity of an engineer may be measured by the manner in which judgment is exercised and in the awareness of responsibilities.

3.9 Ethical Standards

A high ethical standard is a prerequisite for professional engineers, who must be seen as **honest, fair and evenhanded, and having integrity, with a proper concern for people, the environment, and the social and moral consequences of their actions.**

Comment: The relationship between engineers, clients and the community at large will determine the standing of the profession and the respect with which it is regarded by those whom it seeks to serve.

4. Becoming a professional engineer

Qualifying as a professional engineer will normally take a minimum of **eight years training**. This involves an engineering education in an approved university engineering school to degree level (a minimum of **four years post-secondary school**) as **Basic Training**, followed by some **four years of acceptable engineering experience as Advanced Training**, and culminates in a pass at the Professional Interview of the Institution.

The Professional Interview is the examination which determines whether technical and professional competence developed during training are sufficient to justify the candidate's election as a Member of IPES and/or Registration as a professional engineer.

5. Basic Training

The objective of basic training is to give the trainees an academic engineering education and a basic knowledge of the manual processes, procedures, and equipment used in carrying out engineering activities.

Basic Training involves the trainee following an approved course of formal engineering study at university level. As part of the university qualification, the trainee is required to obtain practical experience in the workplace to support this academic education.

5.1 Academic Training

Purpose: to impart through university degree level studies a knowledge of engineering

science, the scientific method, analysis and synthesis upon which engineering is based.

University education is preferred because it involves full-time study and the desired exposure to modern equipment and facilities, as well as providing an intellectual environment in which the student can gain a broad experience in social and political aspects of society.

The university study will equip the student with a sound knowledge and understanding of engineering fundamentals, techniques of analysis/synthesis and specialist up-to-date knowledge in the chosen engineering discipline.

5.1.1 Alternatives to university training

The Rules of the Institution (in Handbook No. 1) set out the requirements for the various grades of membership and provide that as an alternative to a degree, some mature candidates may be permitted to demonstrate academic equivalence. The requirements are set out in Annex I to Appendix 1.

5.1.2 Assessment of engineers whose academic qualifications are in science

Some people have moved into engineering after initial academic qualifications in science. The method of demonstrating equivalence to the basic training requirements of the Institution is contained in Annex O to Appendix 1.

5.2 Practical training

To support academic learning with exposure to the practical techniques and limitations of labor, materials and the environment.

The trainee is given basic knowledge of the manual processes, activities and equipment used in carrying out engineering activities in the workplace. This training is intended to familiarize the trainee with the uses and limitations of the principal hand and machine tools, plant and equipment and the properties used in engineering practice. It also gives opportunities for the trainee to work with skilled and unskilled people in the workshop or on the site.

5.3 Regulations related to Basic Training

Regulation 1 – Academic Training Requirements:

A trainee shall complete an engineering degree at an Australian or New Zealand university or hold an approved qualification in accordance with the examination requirements of IPES.

Regulation 2 – Practical Training Requirement:

A trainee shall complete an approved period of practical training. This regulation is normally satisfied by the practical work experience required by an Australian or New Zealand university before an Engineering or Technology

Degree can be granted, but is normally equivalent to at least 9 months full-time work.*

Practical Training must be completed and approved before a trainee commences Advanced Training. This also applies to those whose basic qualifications are in science.

**Refer Appendix 1 Examination Requirements.*

6. Advanced Training

The objective of advanced training is to develop the professional skills, judgment and maturity of the trainee in the application of engineering science.

This period, usually some four calendar years for most trainees, is concerned with the development of professional skills and the application of engineering science to specific problems, to decision-making and to management.

Advanced training takes not less than three years during which the trainee obtains experience in applying engineering science to practical problems and develops professional skills in decision-making and management. In many engineering fields today the developments have become so complex that an engineer must specialize to be fully efficient, but if training is not suitably organized premature specialization can lead to narrowness of outlook and difficulties in co-ordination and administration especially of multi-disciplinary teams. After graduation, and before professional status is achieved, broadly based training and responsible experience in a number of difficult engineering activities is desirable.

To facilitate the development of professional abilities, the Institution requires that all graduates heading towards Professional Interview carry out their advanced training under the guidance of a mentor (the Supervising Engineer) with periodic reporting to the Institution on the experience being obtained. This will allow training advice to be given, under the procedure described in Section 6.6.

6.1 Office experience

Purpose: to gain experience in the design and planning of engineering systems including the development of professional working relationships, with other professionals and technicians.

While acquiring office experience, trainee is primarily concerned with engineering choices and planning based upon assessments of predicted or expected performance or properties. Experience is also gained in office operations, financial management, and clerical procedures and in working with other professionals and technicians.

The determination of preferred solutions to engineering problems is predominantly an office activity consisting of:

Clarification of objectives; selection of criteria for choice; identification of viable

alternatives; prediction of the performance of each alternative in terms of the adopted criteria; and choice and recommendation.

Analysis, synthesis and design are normally office activity. It involves using the methods of engineering science, technology and mathematics to define and/or predict the behavior of a component, product, structure, network or system and includes the use of these methods to describe and specify and envisaged design or solution in sufficient detail to enable it to be cost estimated and implemented. Research and development is generally an office activity primarily concerned with the science of engineering, but may sometimes include works experience.

6.2 Works experience

Purpose: to implement engineering designs and plans in practical situations and to develop working relationships with other parties involved in the overall engineering process.

The term "engineering implementation" can include the activities of supervision, construction, commissioning, manufacture, operation, investigation and maintenance of a structure, component, product, network or system. The trainee confronts the reality of the engineering environment and acquires engineering judgment through, for example, the experience of translating plans and designs into action; through the exercise of project management skills and in working with other parties such as clients, local authorities and the general public.

6.3 Engineering responsibility

Purpose: to allow the trainee to experience responsibility where there is significant accountability for actions, decisions and commitment of resources.

When evaluating advanced training, consideration is given to the amount of engineering responsibility for the execution of engineering tasks in the office and work activities. This must include significant accountability for actions and delegation of decisions on commitment of funds or resources together with some project or task management. Responsible engineering experience will normally accrue near the end of advanced training.

Responsible experience claimed earlier than two years after graduation will not normally be considered as such.

6.4 Social and ethical responsibility

Purpose: to gain an insight into the ethical aspects of engineering tasks and the social and environmental impact of engineering decisions on the community.

Under this part of advanced training an awareness of the social and environmental consequences of proposed engineering actions is

acquired, together with knowledge of accepted codes of behavior, practices, and standards.

This requires of the trainee a broad appreciation and awareness of the overall impact of engineering activities, beyond the purely engineering environment of initial academic training. To an engineer, professionalism involves more than technical skill in his chosen area.

The development in the trainee of an appreciation of the impact of engineering work on society and the environment cannot be taught, but can be encouraged by exposure to a broad spectrum of thoughts and activities outside the technology and specifics of a particular discipline. This widening of the trainee's horizon during advanced training should increase discernment of the value to society of professionalism in general and professional engineering in particular and should greatly enhance the effect of relevant extracurricular studies carried out during undergraduate years.

6.5 Communication

Purpose: to communicate engineering ideas and concepts to those to whom the professional engineer acts and to those who will carry them out so that the work may be done effectively.

This is involved in all professional activities. It can be written communication (reports, letters etc.), spoken communication in transmitting instructions or detailed information, lecturing, being interviewed or presenting a case, or visual communication in the form of drawings, diagrams and graphs.

A good command of oral and written English is required.

6.6 Supervision of Training and Training Advice and Procedures

6.6.1 Training Advice Procedures (TAP)

- a) IPES provides advice to graduate engineers concerning their progress towards the Professional Interview. This is by means of the Training Advice and Procedures (on the TAP forms).
- b) Initial reporting to the Institution, using form TAP 1, should give a brief summary of experience obtained. No training contact need be made with the Institution until the graduate is into the third year of experience after graduation, unless the trainee has a specific problem not able to be resolved with the employer. The comment from the Institution on the first TAP 1 will normally indicate a timing for the second report (typically after some three years of experience), which may result in clearance for Professional Interview. Where a graduate has, at the time of sending in the initial report, already

obtained four or more years of suitable experience, the Institution may give clearance for Professional Interview without a further training report.

- c) Information on the TAP 1 should be such as to enable a Review Panel (to be selected by the Registration Board from the members of the Institution) to assess the professional development of the graduate. Broad descriptions of activities (including brief comment on physical/financial scale) will suffice and narrative is appropriate. There is no requirement for precise number of weeks in various tasks.
- d) The Review Panel will comment on progress towards the Professional Interview in the light of the prevailing general standards, with the intention of giving guidance towards a successful first Interview. The comments will be brief unless problems have been detected by the Review Panel. Although this document sets the minimum training period as three years, it has been found that most graduates need something over four years of actual experience to reach a standard suitable for Interview.
- e) Further details of the Training Advice and Procedures are given in Appendix 2.

6.6.2 The Supervising Engineer

It is important that those by whom the graduate is employed take a direct part in the planning of training and in the development of the graduate's technical ability and professional maturity. Under the Training Regulations each graduate must have a Supervising Engineer (a mentor) whose responsibilities are:

- a) To assist the graduate to prepare training programme to meet the training requirements of the Institution.
- b) To provide guidance and monitor the progress of the graduate.
- c) To ensure that the graduate has reached a suitable standard of professional maturity and technical ability before applying for Interview.
- d) To review the documentation the candidate proposes to submit for Professional Interview and to ensure that both content and presentation are of adequate quality.

The Supervising Engineer, who must be a Corporate Member or registered engineer, should be able to have personal contact with the graduate at least every four weeks. If the graduate has to look outside the employing organization for a suitable mentor, the person selected should be able to have personal contact with the graduate at least every four weeks and be sufficiently senior to be able to discuss training problems with the employer. It is desirable (but not essential) that the Supervising Engineer be experienced in the same discipline

as the graduate. However, the central question at most Professional Interview is to determine whether the candidate has reached a professional level in matters of experience, engineering judgment and maturity. The standard applied by Interviewers is that which they would deem appropriate in the profession at large and which they would expect of staff working with them or for them although much of the technology on which engineering is based is continually developing, the personal performance factors which interviewers look for have not changed over the years.

Refer to Appendix 2 for additional details.

6.7 Training Counselors

Most engineering graduates are suitably employed and proceed routinely through to a successful Professional Interview. A small number of graduates find themselves in a situation where some aspects of their training are inadequate. The Institution generally becomes aware of these difficulties through receipt of training advice forms or through direct contact with the graduate. In a very small number of cases supervising engineers contact IPES.

In order to provide more effective and immediate advice to those graduates and supervising engineers IPES has instituted a system of regional training counselors.

The counselors are senior and experienced members of the Institution who generally have experience as supervising engineers and as members of the professional Interview Panel. Where possible regional counselors will be of the same discipline as the candidate.

Where the Institution becomes aware of the need for such advice, the graduate or the supervising engineer may be referred to the Regional Training Counselor (a member of the Institution selected by the Registration Board) who will be available to advise on any matter of post-graduate training.

6.8 Regulations relating to Advanced Training

Regulation 3: Advanced Training

3.1 After completing the basic training requirements of Regulations 1 and 2, (See Section 5.3) and before accepted as a candidate for Professional Interview the trainee shall complete a minimum of three years advanced training.

3.2 Advanced training shall be done under the supervision of a professional engineer who should be either a Corporate Member of the Institution or a registered engineer. Should the trainee be employed by an organization, which has no such engineer, the supervising engineer selected from elsewhere should be sufficiently

senior to be able to suggest appropriate training to the employers.

3.3 During advanced training the trainee shall spend a minimum of twelve months engaged in office (design and planning) experience and twelve months in works (implementation) experience. These training periods should preferably be of continuous duty but may be aggregated from periods of intermittent duty of one/two months or more.

3.4 During advanced training the trainee shall spend a minimum of twelve months in positions of engineering responsibility. This may be in either an office or works situation but preferably distributed between them.

3.5 The Registration Board may accept training and experience (including pre-BE experience) gained outside the guidelines set in 3.1, 3.2, and 3.3. Any trainee wishing to have such experience considered must apply in writing to the Registration Board, stating clearly and concisely the grounds on which the application is made. Such application shall be made at the time that the first TAP 1 Form is submitted. The criteria for acceptance of work claimed under this regulation is that the work shall be of similar level to that which would reasonably be carried out by a graduate engineer. The Registration Board will decide what period this alternative to formal Advanced Training will be deemed to represent.

3.6 Post Graduate Research as Advanced Training

The following credits may be claimed for post-graduate work (whether or not a higher degree was obtained).

ME (Course plus project) – 2 months work and 2 months office or lesser combination of the two.
ME (Research thesis only) – 3 months work and 3 months office or lesser combination of the two.
PhD – 6 months works and 6 months office or any lesser combination of the two.

Theses do not normally have to be reviewed by the Institution except that in the case of research work, which did not result in the award of a higher degree the thesis, must be submitted to Registration Board for review. In order for the post-graduate work to be considered as post-graduate training, the work must be carried out under a supervising engineer as stated in Regulation 3.2. The postgraduate thesis cannot normally be used as the subject of the engineering report for Professional Interview.

3.6 A trainee who:

- (a) Is thirty-five years of age or over;
- (b) Is established in a career in which advanced training cannot reasonably be obtained; and
- (c) Has had at least five years responsible engineering experience, may apply to the Registration Board for an assessment of the situation. The Registration Board may accept experience to date as part of all of

advanced training provided that it is satisfied that the trainee cannot obtain advanced training without career disruption and the experience is such that it can be accepted in lieu of advanced training.

7. Professional Interview

The objective of the professional interview is to determine the competence of the candidate to be admitted as a cooperate member of IPES.

This will be assessed by a panel of professional engineers who will consider the training, experience, judgment and maturity of the candidate.

The method of applying for Professional Interview is detailed in the regulations in section 7.1 The interviewers will make their evaluation of the candidate by considering:

- a) The background in engineering from the Personal Record.
- b) The supervised training from the training Advice Form TAP 1 and the comments of the supervising engineer.
- c) Level of skill and judgment from the Engineering Report supported by calculations, drawings etc.
- d) Professional responsibility and maturity from the Professional Interview.
- e) Clarity of written expression and command of English from the Essay.

The Interviewers will then present their recommendations on each candidate to the Professional Panel for their assessment and determination of the result.

7.1 Regulations relating to Professional Interview

Regulation 4: General provisions for Professional Interview

4.1 *An applicant wishing to attend the Professional Interview shall be at least 24 years old and will have completed Basic Training and Advanced Training. Such training must have been completed prior to the closing date of professional Interviews.*

*(Regulations 4.2)
Remaining documents*

Interviewers for October

Application documents and fees 31 July

(Regulations 4.3)

4.3 *Documents required to support an application for professional Interview shall be:*

- a) *For Graduate members of the Institution:
Application For Entry Form
TAP form(s)*

- b) *For other than graduate members of the Institution, the documents in (a) above, together with a photocopy of a certificate attesting an academic qualification meeting the examinations requirements.*

4.4 *Upon receipt of the application documents for Professional Interview, IPES shall review the qualifications and experience of candidates to determine whether the requirements of these regulations have been met, and will notify suitable candidates of acceptance. Candidates not meeting the requirements will be advised of shortcomings, which will require to be remedied prior to a further application.*

4.5 *Candidates accepted for Professional Interview will then submit the following additional documents before the applicable closing date.*

*Personal Record (in duplicate)
Engineering Report and Supporting Documentation
(Refer to Section 7.2)*

4.6 *Prior to the personal Interview, the Interviewers shall make preliminary assessments of the documents submitted to determine if the candidate has reached the accurate standard of competence, responsibility and other aspects appropriate in a Professional Engineer. If the Documents are inadequate in either content or presentation the candidate may be withdrawn from the Interview or asked to supply supplementary material.*

4.7 *Professional Interviews will be conducted in Apia in October in a venue selected by the Registration Board. In circumstances of Particular urgency, the Registration Board may approve the holding of Interviews at times other October and at additional centers in Apia.*

4.8 *Fees payable for Interviews (and review of results) shall be as fixed by the Registration Board from time to time and shown on a current Application for Entry Form.*

Regulation 5: The Personal Interview

Each candidate accepted shall be required to attend at an appointed time and place for personal interview by two interviewers appointed by the Registration Board.

Regulation 6: The Essay

6.1 *During the afternoon of the day on which the personal interview is held each candidate shall be required to write an Essay unless excused from this requirement by the interviewers as a consequence of a previous interview. The Interviewers shall set the subject for the Essay and a choice of subjects may be given. The subject(s) shall be chosen with regard to the*

particular branches of engineering work on which the candidate has been engaged and shall be either of a general nature or on specific aspect of the candidates engineering work.

6.2 Time allowed for writing the Essay is 3 hours.

Beginning at 2pm.

The subject of the Essay shall not be communicated to the candidate before this time. A candidate is not permitted to have any book or notes in the examination room other than a dictionary.

Regulation 7: Determination by the Professional Interview Panel.

7.1 The Interviewers shall present their findings on each candidate to the Professional Interview Panel for consideration and determination of the results. If a candidate has been interviewed be bound by findings arising from a previous interview. In dealing with unsuccessful candidates, the Panel shall establish the specific shortcomings in performance and the type and amount of experience to be obtained before further interview.

7.2 For candidates unsuccessful on their third attempt the panel shall determine whether the candidate should again be accepted for Interview.

7.3 The Registration Board shall notify the candidate by mail of the result of the Interviews soon as practicable. Unsuccessful candidates shall be advised of the reasons for failure, the nature and the amount of future interviews and about any requirements for fresh documentation.

Regulation 8: Document Disposal.

The original of each candidate's personal report shall be retained by the Institution together with the TAP form. All other Documents shall be returned to each candidate.

Regulation 9: Subsequent Interviews

9.1 For Subsequent Interviews, the provision of regulation 4 shall apply.

9.2 A candidate who has at a previous interview written a satisfactory Essay may at the discretion of the subsequent Interview be exempted from writing a further Essay. Such exemption shall be communicated to the candidates after the close of the personal interview.

Regulation 10: Review of Results

10.1 Unsuccessful candidates may within four weeks of the results of the interviews. Apply for a review by letter addressed to the secretary, stating the grounds on which the application is based. Each such application shall be a

combined by the same theme as for Interview.

10.2 The Registration Board whose decision shall be final shall review all such applications.

7.2 Professional Interview: Supporting Documentation.

7.2.1 Personal History

Purpose: to provide a background of the candidates engineering training, experience and professional development.

This Document is to be presented in two parts.

- a) The TAP Forms
(to accompany Application for Entry Form)
- b) Personal Record.
(to accompany Interview Documents)

A clear, concise narrative of between 1000 and 2000 words to demonstrate the progress of the candidate's professional development. This will present, in chronological sequence, tasks involving engineering practice. It can include, but it is not limited to investigation, design, construction, manufacturing, operating, maintenance, teaching or research.

The account is to be elaborate upon the personal history giving emphasis to those areas which the candidates considers were significant in terms of importance, difficulty or of special interest. Relevance social, environmental, economic and public impact factors should also be covered.

The role of the candidates in each task, levels of responsibility and costs and magnitude of projects must be included.

Throughout the narrative names should be given of organizations, employers and individuals quoted in the training Advice Form TAP 1.

7.2.2 Training advice Forms TAP 1A, 1B

Purpose: To enable an IPES review panel and the professional interview panel to assess the professional development of the candidate.

TAP 1A Provides:

- a) Personal Data-Name, Title, etc.
- b) University Qualifications
- c) Other tertiary educational qualifications
- d) IPES approved training credits for:
 - (i) Experience gained prior to an undergraduate engineering degree
 - (ii) Post-graduate study

This Form also includes notes for the guidance of the candidate's supervision engineer.

TAP 1B provides a succinct summary of the advanced training experience gained by the candidates as:

- a) Employer-name of company and location
- b) Nature of Work-clear, concise description of work undertaken

- c) including the physical and financial scope of the work
- d) Date-start/finish dates (month/year)
- e) Period-duration of the particular phase of training
- f) Category of work-office, works and those periods being claimed as responsible experience (office and works)
- g) Supervising engineer's signature- this is to ensure that the candidate's supervisor is aware of the progress of the advanced training.
- g) Supervising Engineer's comments-TAP 1B initially will have been prepared for submission to IPES during the third year of training. The supervisor will have made comments on the candidate progress towards professional interviews at this stage of the training. These comments should be considered carefully before completing the next TAP 1B, which will be needed as part of the professional interview documentation.

7.2.3 Engineering Report

Purpose: to demonstrate the candidate's ability to marshal facts and analyze and select those applicable to the particular problem: then, by exercising judgment based upon reasoning, intuition and experience, synthesis sound engineering solution.

The engineering report is a most important document to the interviewers for it provides an insight into the professional competence, judgment and maturity of the candidate. The subject of the report may be physical, i.e.: a structure, a transmission system, etc, or abstract, i.e.: computer software, a chemical process, etc.

However the following factors must be considered when deciding the material to form the report:

- (a) It must description work actually undertaken by the candidate.
- (b) The report will be a description and appreciation of an engineering problem. It should:
 - (i) Summarize the background.
 - (ii) Define the functional requirements of the work.
 - (iii) Examine the available data.
 - (iv) Consider alternative solutions.
 - (v) Show why a particular solution was selected.
 - (vi) Describe the implementation of the chosen solution in such a manner that a competent engineer from the same

discipline could assess the viability of the project.

- (c) Calculations, drawings, flow diagrams, programs, and any other material, which the candidate considers appropriate, should support the report. The candidate will judge the balance of supporting documentation but where possible, working drawings shall be either the candidate's own work or have been done under the candidate's direct supervision and instructions. Drawings should be of an explicit, rather than of a general layout or pictorial nature. The drawings shall not exceed A1 size.

Engineering calculations shall be of a standard that demonstrates professional competence. They shall also be of a clarity that would allow an independent check without communication with the candidate. The purpose of submitting calculations is to establish that the candidate has a sound fundamental knowledge and is capable of applying this to real problems. If computer printout material based on existing programs is submitted in place of conventional calculations, the candidate will be questioned during the interview on his understanding of the programs.

- (d) The report may also relate to work undertaken by a candidate engaged on engineering research work.

Supporting documents may include:

- (i) Post-graduate theses – to form the subject of the engineering report these must include experimental work can be certified as acceptable to the employing authority (but not Regulation 3.6).
- (ii) Published papers.
- (iii) Related research reports.

The acceptance of the field of research will normally be established when the Training Advice and Procedure Form TAP 1B is assessed by the Institution. If there is any doubt as to likely acceptability, then the advice of the Institution should be sought.

- (e) A candidate over 35 years old who satisfies the examination regulations and has over 10 years senior experience, may submit a project report in place of an engineering report.

This project report will cover the same basic material as the engineering report, but may have a greater emphasis on management and commercial aspects.

Assessment of Report:

The interviewers will assess the engineering report and supporting documents for the following qualities or skills: engineering knowledge, analysis/synthesis, design, judgment, experience, management ability, and professional maturity.

The candidates must take all of these areas into account when selecting a project to form the subject of the engineering report.

It is strongly recommended that the candidate have the Professional Interview in mind when a project is started, so that appropriate documentation can be prepared.

7.3 The Personal Interview

Purpose: to allow the interviewers to explore the candidate's professional maturity and engineering judgment; and to assess the candidate's oral communication skills and personal attributes.

The interviewers will be looking for verification and elaboration of material presented in the supporting documentation. They will test professional maturity and engineering judgment, examine engineering skills and responsibilities, and look at professional management abilities.

Spoken communication is an important facet of the professional. In an interview situation, the candidate's peers can assess this ability.

Ethical and social responsibilities form an essential component of the mature professional engineer. The interview will be structured to

highlight attitudes developed during the candidate's training and experience.

7.4 The Essay

Purpose: to establish that the candidate can produce a clear, complete written presentation of a given subject within a set time.

An essential attribute of the professional engineer is the ability to produce clear written communications on time. They may be detailed technical reports or presentations of complex arrays of fact to a non-technical reader.

This essay is a test of the candidate's competence in producing a well-reasoned, complete written document in the three hours allocated. Subjects for the essay will be chosen having regard to the candidate's work history and may be of a general or specific nature.

Factor, which will be considered when evaluating the essay, will include:

- (a) Content and structure
 - The soundness of the engineering material
 - The completeness of the subject matter
 - The structure of the essay
- (b) Presentation
 - The command of written English
 - A style appropriate to subject material
 - Correct spelling, grammar and syntax
 - Legible handwriting.

Appendix 1

Examination requirements

1. Introduction

This appendix states the basic academic and practical training requirements for an engineering education appropriate for graduate membership and the ways in these requirements may be met.

2. Engineering education

The basic minimum requirement is engineering education to degree level. The standard of degree acceptable within Samoa as engineering education is established by a moderation or review process conducted by the Registration Board, which determine whether a particular degree course meets the requirements of the Registration Board's policy on professional engineering education.

Degree course reviews are conducted at regular intervals either to ensure an existing approved course remains satisfactory, or to assess a new course seeking recognition.

All approved degree courses include a period of practical training in which the trainee is given a basic knowledge of the manual and machine processes, activities and equipment which are used in carrying out engineering activities in the workplace.

This training is intended to familiarize the trainee with the uses and limitations of the principal hand and machine tools, plant and equipment and the properties of the materials used in engineering practice. It also gives opportunities for the trainee to work with skilled people at trades and technician level in the workshop or on the site.

3. Acceptable engineering degrees

- (a) Australian/New Zealand Degrees at present recognized as meeting the IPES standards are set out in Annex A.
- (b) Overseas degrees in engineering must meet the same requirements as in (a) above. No listing is published and each case is taken on its merits. To allow for

the situation where an overseas degree appears to be at a suitable level, but acceptability cannot be clearly established the degree holder may be required to sit a Test by Examination to resolve the matter. The procedure is set out in Annex E.

4. Alternatives to engineering degrees

The basic principle applied in considering educational background other than an engineering degree, is the extent to which the alternate qualification and relevant experience substitute for the academic education and basic training of an approved Australia/New Zealand degree. This principle is applied to the assessment of non-engineering degrees and the mature candidate route to IPES membership.

5. The mature candidate route to membership

To allow for the person who may have acquired engineering education to a professional level without obtaining a university degree, IPES provides the "mature candidate route to membership" as a means of demonstrating that a candidate meets the academic requirements. The procedure is set out in Annex I.

6. Non-engineering degrees

There are a number of degree qualifications, which overlap appreciably with engineering courses both in content and standard. This is particularly true of some science degrees.

Persons who move into engineering having first acquired a science degree may after suitable engineering experience have met the academic requirements of the Institution. The procedure for assessing the extent to which the combination of science degree plus subsequent experience meets the academic requirements is set out in Annex D.

Persons without engineering degrees who want to join as members of the Institution can only be registered as Associate Members with conditions to be determined only by the Board including subscription fees.

Annex A to Appendix 1 Acceptable Engineering Degrees

1. New Zealand and Australia

The following New Zealand and Australian degrees have been recognized as meeting the academic requirements of the Institution:

- Bachelor of Engineering, University of Auckland and Canterbury.
- Bachelor of Engineering, University of New South Wales, Sydney, New Castle.

2. Overseas

As the list of degrees is extensive and changing, queries concerning the suitability of overseas qualification should be directed to the Institution.

Annex B to Appendix 1 Test by Examination to verify academic qualifications

1. Where IPES is unable to establish the acceptability of an academic qualification gained overseas, a candidate may be required to take a further examination to help resolve the matter. This is not a qualifying examination and is available only to those who already have a qualification, which appears likely to meet the requirements of the Institution. The examinations held annually in the first week in September consist of two papers on subjects nominated by candidates from the list below.
2. The examinations may be sat in Apia and applications for Examination must be received by IPES by 15 May, accompanied by the current fee. The fees are not refundable, nor may they be circuited to a later examination through failure to attend.
3. For the examination, candidates must provide their own pens/pencils, slide rules or drawing instruments. Calculators must be battery operated and non-programmable. Other materials (books of tables, etc) will be supplied. The examination answers must be written in English in the books provided and reasonable command of technical English is essential. Three hours is allowed for each of the two papers.
4. Candidates will be notified of their pass or fail within three months of the examination. Only two attempts at the examination are allowed, and failure to attend without adequate explanation will be classed as a failure.

Subjects of examinations

Candidates are required to take two papers, each of three hours duration chosen from the following list. Any two may be chosen, irrespective of the branch of engineering. Both papers must be passed in the one session.

Civil Engineering

- (1) Theory of Structures
- (2) Civil Engineering: Soil Mechanics.
- (3) Civil Engineering: Fluid Mechanics
- (4) Concrete and Metals Technology

Electrical Engineering

- (5) Fields, Circuits, Networks
- (6) Properties of Electrical Materials
- (7) Electronics and Communications
- (8) Energy Conversion and Control

Mechanical Engineering

- (9) Mechanics of Solids
- (10) Dynamics and Theory of Machines
- (11) Mechanical Engineering: Fluid Mechanics
- (12) Mechanical Engineering: Thermodynamics

Aeronautical Engineering

- (16) Aerodynamics
- (17) Aircraft Structures
- (18) Aeronautical Engineering: Thermodynamics

Naval Architecture

- (19) Hydrostatic, Stability, Launching, Flooding, Ship Motions
- (20) Ship Structures
- (21) Ship Propulsion

Industrial/Production Engineering

- (25) Manufacturing Engineering\
- (26) Methods Engineering
- (27) Metrology and Quality Control
- (28) Production Planning and Control

Syllabuses are not published for these subjects, nor are specific textbooks nominated. The material to be examined will have been covered in any adequate engineering course.

Annex C to Appendix 1

The mature candidate route to corporate membership

Regulations.

1. The Rules of IPES set out the requirements for the various grades of membership. Rules dealing with academic qualifications provides that as an alternative to a degree a candidate may be considered for membership subject to having completed at least 15 years of experience in professional engineering; and having demonstrated a good general and scientific education. The mature candidate route is therefore, not for the technician seeking advancement but is for the established mature engineer.
 5. If permission is granted the candidate must then submit relevant supporting documentation produced by the candidate in the course of normal work duties and statements from at least two of the corporate members supporting the application for membership in terms of the requirements of Handbook 1.
 6. This documentation will be reviewed initially by two independent assessors appointed by the Registration Board to determine whether the level of professional experience and education claimed justifies proceeding to a formal assessment. Additional material may be called for as part of this review.
 7. If the documentation is deemed to be acceptable. The Registration Board will appoint a panel to interview the candidate. At least one member of the panel will be of the same discipline as the candidate. At the interview candidates will be examined orally on their experience to demonstrate that in their particular field of engineering they have met the requirements in Handbook 2. The interview panel will question candidates on any aspects of their engineering education thought to be relevant. This interview will cover all aspects of the training and experience of candidates.
 8. The panel will determine whether candidates have achieved the required level of professional engineering knowledge and experience to meet the corporate membership requirements of the Institution.
 9. Fees payable for membership applications by the mature candidate
2. The intention is to provide a route to membership for the very small proportion of candidates who lacking formal academic qualifications at the Australia/New Zealand bachelor of engineering degree level are able to demonstrate that they have achieved a standard of competence comparable to that of their contemporaries who have become corporate members by the preferred route. The preferred route is engineering education to degree level followed by advanced practical training culminating in the Professional Interview and the mature candidate must have a standard of performance just as high as the corporate member who followed this route.
3. Handbook 2 sets out the qualities, which distinguish the professional engineer. Before applying for corporate membership mature candidates should thoroughly acquaint themselves with and be satisfied that they possess these qualities.
4. To seek permission to apply for corporate membership via the mature candidate route candidates shall submit an application on form: a covering letter requesting permission to be considered. A detailed record which demonstrates a

route shall be fixed by the Registration

Board from time to time.

Annex D to Appendix 1

Assessment of engineers whose academic qualification are in science

1. There are a number of persons who have moved into a career in engineering after taking initial academic qualifications in science rather than in engineering. There is a need to establish that although they did not pass through an engineering school or other university facility approved by the Institution they have indeed gained the knowledge and experience which would have been provided in such a school. This should include engineering science and engineering applications material together with specific experience or training in the area of design.
 - (c) His/her qualification is appropriate to the branch of engineering in which he/she is engaged, e.g.: chemistry for a chemical engineer physics for a metallurgical engineer, etc.
 - (d) The applicant has had at least 12 months training and experience in a recognized field of engineering after completion of the qualification for a period of not less than four years.
 - (e) The applicant has had at least 12 months training and experience in design (which is distinct from the "office" experience required by the training regulations:
 - (f) The qualification together with the subsequent experience is adequate to enable the applicant to apply scientific principles to engineering problems.
 - (g) That the applicant has had adequate practical training equivalent to the practical training required for a normal engineering degree.
2. In reviewing the situation of any candidate the Registration Board will take account of the quality and nature of the initial science qualification and will review the subsequent pattern of experience to determine the extent to which the requirements of the Institution have been met.
3. The Registration Board must be satisfied that:
 - (a) The applicant is engaged in work that is predominantly professional engineering:
 - (b) His/her qualification is an Honors level degree or equivalent approved for this purpose by the Registration Board.

A candidate satisfying all of the above criteria will have satisfied the academic requirements of the Institution. In any assessment the Registration Board will determine what portions of the experience can be accepted as contributing to meeting the academic requirement. The balance (if any) of the experience will be considered for acceptability as advanced training under the requirements of Section 6 (Appendix 1) above.

Appendix 2

Training advice procedures and the supervising Engineer

The training advice procedures now in use were developed in response to a number of problems affecting some graduates.

These problems can be summarized as:

- (a) Employment where the scope or type of work available within the firm did not allow proper professional development.
- (b) The lack of a proper training programme or inadequate thought being given to graduate development.
- (c) Supervising engineers taking little interest in the training of their employees.

These are problems evident in both large and small organizations.

The present training advice procedures aim to identify these problems and provide assistance to candidates. They cannot take the place of an effective supervising engineer.

In filling out the TAP 1, candidates and supervising engineers should therefore bear in mind the aim to the training advice procedures. Comments sent back to the candidates will in general be very brief and most candidates whose training is satisfactory will simply be told so without embellishment. If a problem is detected the candidate will be given brief advice and in some cases may be referred to a Training Counselor through the Review Panel of IPES.

Ultimately it is the intention of the Institution to raise the standard of training and supervising engineers to a level that no longer requires the use of training advice procedures. The health of the Institution and of professional engineering generally is critically dependent on the standard of training and supervision provided by all corporate members of IPES and the interest they show in it.