BBTS Specialist Certificate in Transfusion Science Practice Prospective Student Guide

British Blood Transfusion Society

At a Glance:

Award:	**BBTS Specialist Certificate in Transfusion Science Practice** *Accredited by The University of Manchester (45 level 7 / Master's level credits)* MANCHESTER 1824 The University of Manchester *Endorsed by the International Society for Blood Transfusion (ISBT)* ISBT
Duration:	12 months (programme begins each May)
Delivery:	Distance-learning/ e-learning
Entry Requirements:	You *must*: • have a BSc in a relevant healthcare science or demonstrable equivalent ○ e.g. candidates with HCPC or ACSLM registration, but without a BSc, are deemed to have demonstrable equivalence • be working at practitioner level (NHS career framework grade 5 equivalent) or higher • be working in a transfusion laboratory environment during the programme of study • be a member of the BBTS If you do not meet these minimum requirements your application will be automatically rejected
How to Apply:	Applications are open once each year for 6 weeks. • Enrolment period: 1st Oct to 12th Nov each year • Applications will not be considered outside these dates. *Your application must be supported by your laboratory manager for the duration of the programme.* Course begins: May each year (following enrolment period)
Course Description:	This course is designed to provide you with a thorough grounding in the theory and practice of transfusion science as conducted within the modern transfusion science laboratory. It is • designed for UK Health and Care Professions Council (HCPC) registered Biomedical Scientists (BMS) working in transfusion science either in a blood establishment (blood centre) or a hospital transfusion laboratory. • recognised by NHS Trust Hospitals and the UK Blood Services: NHS Blood and Transplant, Scottish National Blood Transfusion Service, Welsh Blood Transfusion Service, Northern Ireland Blood Transfusion Service as supporting evidence of fitness to practice at 'specialist' level (NHS career framework grade 6 and above). • recommended by the UK Transfusion Laboratory Collaborative: Minimum standards for staff qualifications, training, competency and the use of information technology in hospital transfusion laboratories (Chaffe et al, Transfusion Medicine, 24 (6) 2014 for 'all lone-working staff whether working supervised or unsupervised'). Over the programme you will build and consolidate your core knowledge and understanding of transfusion science, while developing your analytical and practical skills required for data interpretation, critical thinking and provision of solutions to differing laboratory situations.
Fees:	Programme cost: £891 The fees include the course tuition, learning materials and administration costs during your studies. *BBTS membership is not included.*
Contact:	Education Officer: Connor Cousins For all enquiries: Email: connor.cousins@bbts.org.uk or bbts@bbts.org.uk Telephone: 0161 232 7999

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Introduction

The BBTS Specialist Certificate in Transfusion Science Practice is designed for UK Health and Care Professions Council (HCPC) registered Biomedical Scientists (BMS) working in transfusion science either in a blood establishment (blood centre) or a hospital transfusion laboratory.

- *Medical Scientists registered with the Academy of Clinical Science and Laboratory Medicine (ACSLM) in Ireland are a recognised equivalent and are welcome to apply.*
- *Non-HCPC registered NHS employees working in transfusion science must be working at career grade 5 (or higher) to be eligible. This is typically equivalent to entry-level BMS grade.*
- *Applications from other non-UK based scientists working in blood transfusion will be considered on a case-by-case basis but must also meet the following minimum eligibility criteria. Please note that this qualification is based on UK practices and guidelines.*

This qualification will provide you with evidence of specialist knowledge* in transfusion science, following HCPC registration at practitioner level, required to demonstrate your specialist and independent practice capabilities. It is accredited by the University of Manchester (45 level 7 credits).

**The BBTS Specialist Certificate is not a certificate of competence to practice; the assessment of competence remains the responsibility of your employer.*

This programme of study will build and consolidate your core knowledge and understanding of transfusion science, while developing your analytical and practical skills required for data interpretation, critical thinking and provision of solutions to differing laboratory situations, commensurate with the level of Specialist Practitioner in Transfusion Science (NHS career framework grade 6 and above).

Entry Requirements

You must:

- have a BSc in a relevant healthcare science or demonstrable equivalent
    - e.g. candidates with HCPC or ACSLM registration, but without a BSc, are deemed to have demonstrable equivalence
- be working at practitioner level (NHS career framework grade 5 equivalent) or higher
- be working in a transfusion laboratory environment during the programme
    - applicants not working in a transfusion environment are not eligible for this programme
- be a member of the BBTS
    - on application
    - throughout the programme (including any deferral period)
    - at examination and result release
        - Failure to maintain/renew membership fees may result in withdrawal from examination / programme and/or a deferral being voided.

And preferably have:

- previous experience of working in a transfusion laboratory or establishment at practitioner level (recommendation: minimum of 6 months)

Additional information for International Applicants:

- This qualification is based on UK practices and guidelines only
- Proof of your English language proficiency is required (see later)
    - In line with current UK Health and Care Professions Council (HCPC) requirements

- Exemptions may apply

English Language Proficiency for International Applicants:
Where English is an additional language you must provide the following test certificate(s):

- International English Language Testing System (IELTS - Academic or General)
  - Minimum Score: 7.0 with no element below 6.5

Or

- Test of English as a Foreign Language (TOEFL iBT)
  - Minimum score: 100/120
  - TOEFL test scores undertaken in the United Kingdom are not accepted

Or

- Occupational English Test (OET)

* The test certificate supplied must be less than 2 years old

Most English language test results are only valid for two years and must be valid on the start date of the course.

Exemption from language proficiency test:
If you are a citizen of a relevant European State* you do not need to provide proof of your English language proficiency. To be exempt from providing proof of English Language competence you must provide evidence that you are a citizen of a relevant European State e.g. a certified copy of your passport or a certified copy of your national identity card.

*Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland.

Course Description

This course is designed to provide you with a thorough grounding in the theory and practice of transfusion science as conducted within the modern transfusion science laboratory.
In particular, the programme will provide you with evidence of specialist knowledge in transfusion science, following HCPC registration at practitioner level, required to demonstrate your specialist and independent practice capabilities (NHS career framework grade 6 and above).

Aim
This course aims to give you the knowledge, understanding, analytical and practical skills to interpret data, solve problems and provide solutions to differing laboratory situations, commensurate with the level of Specialist Practitioner in Transfusion Science.

Teaching and Learning
The course begins with a face-to-face Induction day and is subsequently delivered online via the Student Area of the BBTS website.
You will have access to a dedicated online student area with

- Monthly online presentations (with audio)
- Guided learning schedule
- Student forum (for discussion activities)
- Interactive quizzes
- Directed and recommended reading

The course text book, 'Introduction to Transfusion Science Practice' is the platform for the teaching and learning on this programme and is included in the fees.

Who will be teaching me?
All course materials are designed and delivered by a team of BBTS members with specialist expertise in transfusion science practice, education and training. The course text book includes action/ reflection tasks, as well as a number of self-assessment questions and exercises to help consolidate your learning/ understanding. At different stages of the programme you will be directed to complete these activities and discuss your findings online with other students.
To be successful, active participation in the programme is required. This will be monitored during the 12 months. In order to achieve 45 level 7 credits students are expected to participate in 10 hours of scheduled study per credit. This figure is calculated based on the average time a learner takes to achieve the specified learning outcomes. Examples of learning activities include taught sessions, independent/ self-directed study, and work-based events. You should not expect to simply read the text book and be able to pass the examination.

Learning at work while undertaking this programme
One aim of this programme is to link your underpinning and specialist knowledge with your everyday transfusion practice. In addition, it will expand and deepen your understanding of those aspects of transfusion science with which you may be less accustomed. It is expected that you will use your experiences of routine working in either a hospital transfusion laboratory or blood services laboratory (or both) during this programme to help you consolidate your learning.

Assessment
All assessments are constructed to evaluate your knowledge and understanding while at the same time refining and expanding your intellectual and transferable skills.
In-programme (not graded):

- Compulsory discussion activities
- Self-assessment and review activities

End of programme final assessment (graded):

- Online examination – securely accessed over a 2 day period (usually second weekend in May at end of programme)
- Paper 1; Multiple Choice Questions (25%)
- Paper 2; Short Answer Questions (25%)
- Paper 3; Data interpretation (20%)
- Paper 4; Specialism: data interpretation and case scenarios (30%)

It is important that you read the **Programme Terms and Conditions** for the BBTS Specialist Certificate *before* enrolling for this programme. The current version is available on the BBTS website education pages https://www.bbts.org.uk/education/bbtsqualifications/specialistcerttsp/examtandc/

Unit details
The course comprises 2 units studied over a 12 month programme;

- Unit 1; compulsory core transfusion knowledge
- Plus your chosen specialist unit; unit 2 or unit 3
- To successfully exit the programme with 45 level 7 credits you need to complete unit 1 plus either unit 2 or unit 3

Unit 1: Transfusion Science Practice (Core: 30 credits)

This unit will provide you with knowledge and understanding of a broad range of topics within transfusion science. You will become familiar with methods and strategies to investigate, and gain experience of the interpretation of routine patient and blood donation related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

Unit 2: Immunohaematology (Optional specialism: 15 credits)
This unit will provide you with knowledge and understanding of patient-related transfusion science practice, management of patients requiring blood transfusions and appropriate investigations. You will become familiar with methods and strategies to investigate and gain experience of the interpretation of complex patient related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

Unit 3: Donation Testing and Component Processing (Optional specialism: 15 credits)
This unit will provide you with knowledge and understanding of blood donation-related transfusion science practice. You will understand the processing and testing requirements for blood donations. You will become familiar with methods and strategies to investigate and gain experience of the interpretation of complex blood donation related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

See Appendix 1 for full unit descriptions; See appendix 2 for an example of the 12 month programme of study.

IT Requirements
Due to the nature of the online resources, activities and examination, you will need access to a reliable internet source and to use the most up to date browser e.g.

- Windows: Internet Explorer 11, Microsoft Edge (latest version), Google Chrome (latest version), Firefox (latest version)
- Mac: Safari (latest version), Google Chrome (latest version), Firefox (latest version)
- Mobile: Safari in Apple iOS 10 or later, Google Chrome in Apple iOS 10 or later, Google Chrome in Android OS 4.4 or later

Application, Selection and Enrolment

How to apply:
The enrolment period runs from 1st October to 12th November.
Applications received at any other time will not be considered.
You will need to:

- download the relevant form (i.e. UK/ RoI or International application) available at www.bbts.org.uk
- complete all details and save a copy
    - Please save the file as 'full name TSP app' e.g. Joe Smith TSP app
    - Any supporting documents required must also be identified by your name
- email to tspapplications@bbts.org.uk
- You will receive an automated response once your email is received
    - *this is an automated mailbox; please do not send enquiries to this address as they will not be answered*

Selection Process:
Review of all applications takes place over a 2 week period following enrolment closure. You will be notified of the outcome by the 3rd week (may be subject to slight delays dependent upon volume of received applications)
The following criteria are used to sort applicants should the course be oversubscribed:

- Length of BBTS membership
- Personal statement (reasons for applying)

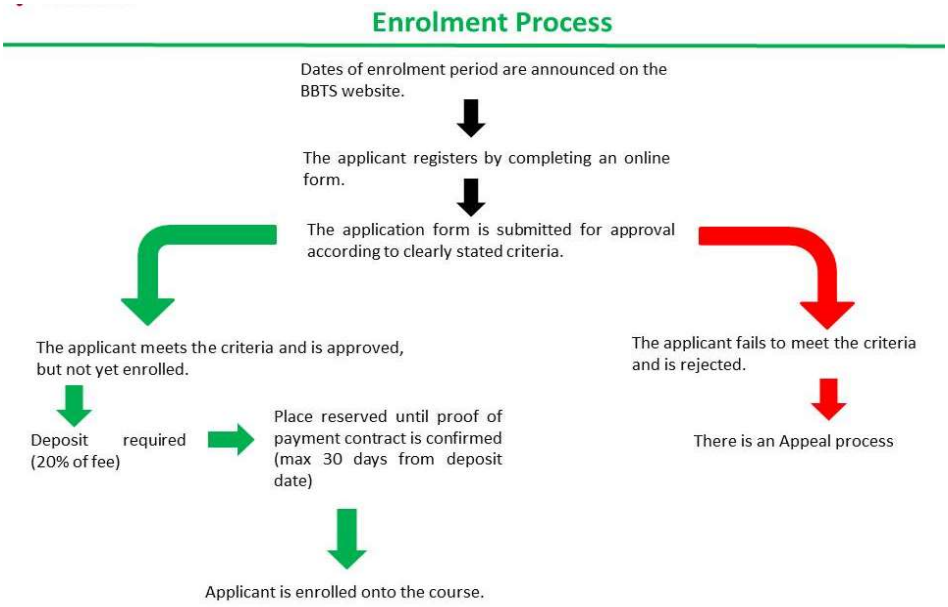
Appeals

If you are unsuccessful there is an appeals process

- Submit your appeal by email and by 14th December
- Outcome of appeal will be returned within 4 weeks of appeal submission date.

Enrolment Process:

- Confirmation of support is required from your manager
    - BBTS will contact them by email (please ensure their contact details are correct)
    - Any delay in confirmation will postpone your enrolment
- Payment of the deposit (20%) by the 31st of January (following approval notification)
    - Your place is reserved/ provisional
- Proof of ability to make full payment is confirmed
    - Once received, your enrolment is complete



Fees and Finance

The cost of the programme is **£891**.

This includes

- a personal copy of the course text book 'Introduction to Transfusion Science Practice'
- access to student-only online resources
- the online examination fee
- one online resit fee (if required)

Additional fees:

- All students must be BBTS members
    - on application
    - throughout the programme (including any deferral period)
    - at examination and result release date
        - Failure to maintain/renew membership fees may result in withdrawal from examination / programme and/or a deferral being voided.

	Self-funded	**Employer-funded**

Payment Options	20% Deposit	Instalment 1*	Instalment 2*	Instalment 3*	Total payment	20% Deposit^	Balance	Total payment
Option 1	£178.20	£249.48	£249.48	£249.48	£926.64*	£178.20	£712.80	£891
Option 2	£178.20	£712.80	N/A	N/A	£891			
Due Date	31st January	14th May	31st July	31st Oct		31st January	30 days post invoice date or 31st March	

** payment by instalments is subject to an administration charge*

^ where possible the deposit must be paid by the applicant; fully employer-funded applicants will only receive full enrolment confirmation once the full balance has been received from an employer

- **Please note:**
  - non-payment/ late payment of course and/or BBTS membership fees will result in your suspension from the programme.
  - Persistent non-payment of fees may result in your course place being rescinded.

Contact

Role	**Named Contact**	**Email Contact**	**Postal Address/Tel:**
Education Officer	Connor Cousins	connor.cousins@bbts.org.uk	BBTS Enterprise House Manchester Science Park Lloyd Street North Manchester M15 6SE 0161 232 7999
Senior Education Officer	Michaela Cheetham	bbts@bbts.org.uk	
Programme Examiner	Amanda Davies	bbts@bbts.org.uk	
External Examiner*	Vanja Crew	bbts@bbts.org.uk	
Programme Director (from Oct 2023)	David Roberts (BBTS President)	bbts@bbts.org.uk	
Academic Advisor (University of Manchester)	Dr Philip MacDonald	bbts@bbts.org.uk Any relevant queries will be forwarded on	

*Please note that it is inappropriate for students to make direct contact with the External Examiner regarding this programme under any circumstances. All appeals must go through the appeals process detailed in the Student Guide and Terms and Conditions document.

If you are unsure of any of the information provided, or have any other queries, please contact the Education Officer at connor.cousins@bbts.org.uk

Appendix 1: *Unit descriptors*

Unit 1: Transfusion Science Practice (Core: 30 credits)

This unit will provide you with knowledge and understanding of a broad range of topics within transfusion science. You will become familiar with methods and strategies to investigate, and gain experience of the interpretation of, routine patient and blood donation related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

Indicative Content

In this unit, you will learn about:

- Human Immune Response with regard to blood groups and transfusion
- Major blood group systems
- Clinical Significance of blood group antibodies
- Basic overview of haemolytic disease of the fetus/ new-born with respect to red cell antibodies
- Processing, testing and issuing of blood components (including the selection of blood donors)
- Pre-transfusion testing undertaken in UK transfusion laboratories
- Hazards associated with transfusion of blood components and investigative/ preventative measures (including haemovigilance)
- Quality Management Systems (including Quality Assurance and Quality Control in the transfusion laboratory setting)
- British Committee for Standards in Haematology (BCSH) guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories
- Guidelines for the Blood Transfusion Services in the UK, European Blood Safety Directives, Blood Safety and Quality Regulations

Learning Outcomes

You will be expected to:

1. Determine, explain and classify antibody production with respect to blood group systems. Compare and contrast the major blood group antibodies.
2. Describe, explain and classify antibody– antigen reactions, the classical complement cascade and antibody-mediated red cell destruction. Examine and categorise causes of intravascular and extravascular red cell destruction.
3. Describe, explain and categorise the key features of the ABO, Rh and other major blood group systems (Kell, Duffy, Kidd, MNS, Lewis, Lutheran and P1PK)
4. Describe, explain, demonstrate, interpret and classify automated and manual serological laboratory tests performed in blood transfusion (to include patients and donors).
5. Examine and solve anomalous serological results for a range of laboratory tests
6. Describe, explain, justify and contrast the similarities and differences between patient-related and blood donor-related serological testing
7. Explain, determine and prioritise the principles and practice of Quality Management Systems including quality assurance and quality control in blood transfusion laboratories.
8. Determine, explain and predict the hazards associated with various aspects of blood transfusion. Examine the operation of the haemovigilance scheme in the UK
9. Describe, categorise and explain donor selection criteria in the UK
10. Describe, categorise and explain processing, testing, storage and specification criteria and issuing of routine blood components supplied by the UK blood services
11. Describe, explain, categorise and investigate the mechanism of haemolytic disease of the fetus/ new-born. Justify routine antenatal testing requirements

Unit 2: Immunohaematology (Optional specialism: 15 credits)

This unit will provide you with knowledge and understanding of patient-related transfusion science practice, management of patients requiring blood transfusions and appropriate investigations. You will become familiar with methods and strategies to investigate and gain experience of the interpretation of complex patient related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

Indicative Content

In this unit you will learn

- Antibody screening, identification, crossmatching and red blood cell selection (including special requirements) in pre-transfusion testing
- Red cell antibody monitoring and blood provision in haemolytic disease of the fetus/ new-born; BCSH guidelines for blood grouping in pregnancy and antibody testing in pregnancy
- Blood group serological reactions in Autoimmune haemolytic anaemia
- Blood group serological reactions in a suspected transfusion reaction
- BCSH guidelines on the administration of blood components
- BCSH guidelines for the estimation of Fetomaternal Haemorrhage
- BCSH guidelines for the use of fresh-frozen plasma, cryoprecipitate and cryosupernatant
- BCSH guidelines for the use of irradiated blood components
- BCSH guidelines for neonates and older children
- BCSH guidelines for the specification and use of information technology (IT) systems in blood transfusion practice

Learning Outcomes

You will be expected to:

1. Outline and analyse variants associated with the ABO and Rh blood group systems. Determine and describe the implications for patients
2. Determine, explain, formulate and interpret the investigation of complex serological reactions, including recommendations for resolving unexpected anomalies, in patient testing.
3. Determine, describe and explain the design, operation and performance of serological techniques used in the investigation and management of haemolytic disease of the fetus/ new-born. Categorise and recommend management strategies for a range of blood group antibodies.
4. Determine and explain the serological problems associated with autoantibodies with respect to blood transfusion
5. Determine and describe the design, operation and performance of serological techniques used in the investigation and management of autoimmune haemolytic anaemia. Categorise and recommend management strategies for blood provision for patients with cold and warm autoantibodies.
6. Determine, explain and interpret the investigation of a suspected transfusion reaction. Discuss the possible causes.
7. Explain and categorise the principles and practice of, and determine between, serological and electronic issue of blood components
8. Discuss and categorise the principles and mechanisms of, and recommend, blood component selection for a range of patients (including fetus/ neonate, haematological, BMT, HSCT, rare blood groups, pregnant women, immunocompromised, children, transfusion-dependent)

Unit 3: Donation Testing and Component Processing (Optional specialism: 15 credits)

This unit will provide you with knowledge and understanding of blood donation-related transfusion science practice. You will understand the processing and testing requirements for blood donations. You will become familiar with methods and strategies to investigate and gain experience of the interpretation of complex blood donation related results. You will be expected to relate this knowledge to the workplace as you learn to perform relevant laboratory methods.

Indicative Content

In this unit you will learn about:

- Preparation and quality monitoring of blood components
- Preparation and specifications of blood components with special requirements
- Testing requirements for blood donations in the UK
- Transfusion transmitted infections with respect to blood donation
- European Blood Safety Directives and Blood Safety and Quality Regulations
- Guidelines for the Blood Transfusion Services in the UK
- BCSH guidelines for the use of irradiated blood components
- BCSH guidelines for neonates and older children

Learning Outcomes

You will be expected to:

1. Determine, explain and discuss the design, operation and performance of processing techniques for blood components
2. Determine, explain and categorise additional processing and testing requirements for non-routine blood components
3. Identify, explain and categorise quality monitoring procedures applied to blood components
4. Determine, describe and categorise the design, operation and performance of automated and semi-automated testing technology used in blood donor testing.
5. Determine, explain, formulate and interpret the investigation of complex serological reactions, including recommendations for resolving unexpected anomalies, in donor testing
6. Describe and categorise the aetiology of transfusion transmitted infections. Discuss and recommend investigations for a range of transfusion transmitted infections.
7. Determine, describe and explain component validation, specification and labelling criteria

Generic Learning Outcomes (applicable to all units)

Intellectual skills

You will be expected to:

1. Critically analyse scientific data
2. Evaluate results commonly encountered in blood transfusion laboratories
3. Apply knowledge of transfusion science to address specific laboratory problems

Practical skills

You will be expected to:

1. Present information clearly in the form of verbal and written reports.
2. Communicate complex ideas and arguments in a clear and concise and effective manner.

Transferable skills and personal qualities

You will be expected to:

1. Present complex ideas in simple terms in written format.
2. Consistently operate within sphere of personal competence and level of authority.

3. Select and apply appropriate analysis or assessment techniques and tools.
4. Actively seek accurate and validated information from all available sources.
5. Evaluate a wide range of data to assist with judgements and decision making.
6. Interpret data and convert into knowledge for use in the clinical context of individual and groups of patients and donors.
7. Work in partnership with colleagues, other professionals, patients and their carers to maximise patient care

Appendix 2: *Example Programme of Study Overview (not to be used as an active study plan)*

Duration: 12 months May to April **To ensure you are keeping to schedule you must log on to the BBTS student area regularly to view the most current/ up-to-date information and tasks.**		
Month 1 topics	**Learning outcomes**	**Tasks**
1. Immunology refresher 2. Antigen-antibody reactions	Explain what constitutes a blood group antigen Explain and describe the composition of the red cell membrane Explain, describe and discuss blood group antibody production with respect to ☞ Stimulation processes ☞ Primary and secondary immune responses ☞ Polyclonal antibodies ☞ Monoclonal antibodies Describe basic antibody structures and properties of IgG and IgM Explain the primary and secondary stages of antigen-antibody reactions Explain the factors affecting antigen-antibody reactions Explain how tests can be manipulated to enhance results Explain the different endpoints of antigen-antibody reactions	• Read chapters 1 and 2 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapters 1 and 2 • Take part in the first compulsory discussion activity
Month 2	**Learning outcomes**	**Tasks**
3. Reagents, techniques and controls	Explain how manufactured reagents help to ensure valid results Explain the following with respect to serological testing ☞ the need for, and use of controls and how to select them ☞ the range of reagents available ☞ the different techniques used ☞ the use of enzyme treated cells ☞ the use Anti-Human Globulin (AHG) ☞ the requirement for different red cell suspensions and how they are used Recognise the requirement for equipment maintenance and calibration	• Read chapter 3 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 3 • Take part in the second compulsory discussion activity
Month 3	**Learning outcomes**	**Tasks**
4. Antibody mediated red cell destruction	Explain the basics of the classic complement cascade including: ☞ the sequences of the classic complement cascade ☞ how the complement cascade is regulated Outline the mechanisms of intravascular and extravascular red cell destruction Explain the differences between intravascular and extravascular red cell destruction Describe the clinical signs and symptoms of *in vivo* red cell destruction Identify the factors affecting the clinical significance of blood group antibodies Explain and distinguish between the following terms ☞ Inheritance	• Read chapters 4 and 5 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapters 4 and 5 • Take part in the third compulsory discussion activity

5. Basic genetics and transfusion terminology	☞ DNA ☞ Chromosome ☞ Gene ☞ Allele ☞ Polymorphism Explain the following basic inheritance terms ☞ Dominant gene ☞ Co-dominant gene ☞ Recessive gene ☞ Amorphic gene Explain how genetic inheritance can result in different blood group antigen expression Understand how genes result in protein expression Explain the terms genotype and phenotype Interpret genotype into phenotype (and vice versa) Describe, explain and use blood group terminology	
Month 4	**Learning outcomes**	**Tasks**
6. The ABO blood group system	Describe the basic genetic background of the ABO system ☞ Investigate family trees based on ABO grouping results Describe the biochemistry of ABO antigen production ☞ List the ABO transferases, explain their action and list their products Describe and discuss the different antigens of the ABO system with respect to ☞ expression ☞ development at birth ☞ common subgroups ☞ some rare subgroups List the frequencies of the four major ABO blood groups in the UK population List some of the frequency variations found in different ethnic populations Explain and discuss the relationship of the H blood group system to the ABO blood group system Outline the mechanism leading to the Oh (Bombay) blood group including ☞ inheritance patterns	• Read chapter 6 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 6 • Take part in the fourth compulsory discussion activity
Month 5	**Learning outcomes**	**Tasks**
7. The Rh blood group system	Describe the basic genetic background of the Rh system Explain and use terminology relating to Rh ☞ genotypes ☞ haplotypes ☞ phenotypes Describe and discuss the Rh system with respect to	• Read chapter 7 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 7 • Take part in the fifth compulsory discussion activity

	☞ antigen development at birth ☞ weak D types ☞ D variants/ partial D types ☞ Rh deletions ☞ Rh_{null} phenotype ☞ the C, c, E, e and G antigens List the frequencies of the 5 major Rh antigens in the UK population List some of the frequency variations found in different ethnic populations Describe and discuss Rh antibodies with respect to ☞ production ☞ immunoglobulin class ☞ methods of detection ☞ ability to bind complement ☞ clinical significance ☞ selection of blood components for transfusion	
Month 6	**Learning outcomes**	**Tasks**
8. Other Blood group systems	Describe the main features and characteristics of the following blood group systems ☞ MNS ☞ P1PK ☞ Lutheran ☞ Kell ☞ Lewis ☞ Duffy ☞ Kidd Determine, discuss and categorise the clinical significance of the different antibodies produced by the major blood group systems Determine, compare and contrast the *in vitro* characteristics of the different antibodies produced by the major blood group systems List the main antigens and their frequencies for a range of populations for the major blood group systems Discuss the impact of differing antigen frequencies on availability of antigen negative (or IAT crossmatch compatible) red cells for transfusion Calculate the availability of various antigen negative red cells in the UK donor population for a variety of antibody specificities ☞ Including for patients with multiple antibodies Identify a variety of null phenotypes and explain their implications for transfusion Show awareness of some antigens and antibodies of the following minor blood group systems and their implications for transfusion	• Read chapters 8 and 9 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 8 and begin those in chapter 9 • Take part in the sixth compulsory discussion activity

	☞ I ☞ Diego ☞ Yt ☞ Dombrock ☞ Colton ☞ Indian ☞ Vel ☞ Knops ☞ Chido/ Rodgers	
9. Antibody Screening and Identification	Explain the purpose of antibody screening Explain the difference between antibody screening and identification Recognise and describe good and poor examples of screening and identification reagent cells	
Month 7	**Learning outcomes**	**Tasks**
10. Antibody Screening and Identification continued	Describe and perform the process of antibody identification Describe and perform the process of antibody exclusion including ☞ correct selection of reagent red cells ☞ requirement for 'double-dose' antigen expression for certain antibody specificities Explain, describe and recognise the requirement for additional antibody identification tools ☞ Enzyme technique ☞ Enzyme IAT ☞ Room Temperature technique (18-22oC) ☞ Red cell phenotyping	• Continue with chapter 9 • Read chapter 10 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 9 and begin those in chapter 10 • Take part in the seventh compulsory discussion activity
11. Pre-transfusion testing	Describe, explain and discuss sample acceptance and storage criteria including ☞ Positive patient identification ☞ Clerical and demographic checks ☞ Use of EDTA samples ☞ Sample collection timing ☞ Sample storage and retention Describe, explain and discuss routine sample testing requirements	
Month 8	**Learning outcomes**	**Tasks**
12. Pre-transfusion	Describe, explain and discuss additional testing requirements Describe, explain and discuss the selection of red cells for transfusion including ☞ ABO group choices	• Continue with chapter 10 • Read chapter 11 • Access the supplementary online materials as directed

testing continued 13. Hazards of Transfusion	☞ D group choice ☞ Crossmatching procedures ☞ Patients with alloantibodies ☞ Specific patient groups with additional considerations Outline, explain and discuss the provision of red cells in an emergency situation including ☞ Abbreviation of routine testing Outline, describe, explain and discuss hazards associated with blood transfusion under the following headings: ☞ Transfusion Transmitted Infections (TTI) ☞ Mechanical Effects ☞ Metabolic Effects ☞ Immune Reactions Describe, explain and discuss the preventative measures in place to safeguard the blood supply Describe, explain and discuss reactive response to hazards of transfusion when they occur Outline, explain, investigate and discuss the issues and actions required following a suspected transfusion reaction to a blood group antibody Explain and discuss the limitations of pre-transfusion testing procedures in preventing haemolytic transfusion reactions due to blood group antibodies Describe and explain haemovigilance Describe and discuss UK transfusion hazard reporting systems including ☞ Who, what, when, how, why ☞ Reporting categories	• Complete the action/ reflection exercises in chapters 10 and 11 • Take part in the eighth compulsory discussion activity
Month 9	**Learning outcomes**	**Tasks**
14. Blood Components	Outline the basic eligibility criteria for blood donation in the UK Describe and discuss the whole blood collection process Outline the apheresis collection process (component donation) Describe and discuss the Donation Identification Number (DIN) system used in the UK Outline, describe, explain and discuss blood donation, transportation and processing timelines Outline, describe, explain and discuss the manufacture of routine blood components ☞ Red cells ☞ Pooled platelets ☞ Fresh Frozen Plasma ☞ Cryoprecipitate Describe, explain and discuss universal leucodepletion as a preventative measure to safeguard the blood supply Outline, explain and discuss additional requirements for component manufacture for ☞ Fetal, neonatal and paediatric use	• Read chapters 12 and 13 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 12 and begin those in chapter 13 • Take part in the ninth compulsory discussion activity

	☞ Adult patients with special requirements ☞ Irradiation process ☞ Pathogen inactivation/ reduction measures Describe, explain and discuss the UK specifications, storage and use of blood components ☞ Routine ☞ Non-routine ☞ Adult use ☞ Fetal, neonatal and paediatric use Outline the *basic* clinical demand for ☞ Red cells ☞ Platelets ☞ Fresh Frozen Plasma ☞ Cryoprecipitate ☞ Granulocytes	
15. Blood Donation Testing	Describe, explain and discuss component selection by ABO group for a range of patients Outline basic quality monitoring for blood component manufacture Explain and discuss the effects of storage on blood components Explain and discuss the benefits and limitations of Methylene Blue treatment of blood components Outline, describe and explain the mandatory tests required to ensure the safety of the UK blood supply Outline, describe and discuss blood grouping tests performed on UK blood donors including ☞ Protocols used to optimise ABO and D grouping of blood donors ☞ ABO and D grouping anomalies (identification and investigation) ☞ Additional phenotyping that may be performed by the blood grouping laboratory ☞ Antibody screening (adult and neonatal components) ☞ High-titre haemolysin screening ☞ Haemoglobin S screening	
Month 10	**Learning outcomes**	**Tasks**
16. Blood Donation Testing continued	Give an overview of the following transfusion transmissible infections ☞ HBV ☞ HIV ☞ HCV ☞ HTLV I/II ☞ Syphilis ☞ CMV ☞ Malaria ☞ *Trypanosoma cruzi* ☞ West Nile Virus	• Continue with chapter 13 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 13 • Take part in the tenth compulsory discussion activity

	Outline, describe and discuss microbiological tests performed on UK blood donors including ☞ Rationale for mandatory tests ☞ Rationale for additional/ discretionary tests ☞ Detection of various microbiological markers and associated window periods ☞ Bacterial testing of platelet components	
17. Antenatal Serology	Outline, explain and discuss the cause of HDFN Outline and discuss the mechanisms that can lead to antibody production in the mother Explain the consequences of red cell destruction in utero and after birth Explain and discuss the properties of blood group antibodies with respect to HDFN ☞ Classify the blood group antibodies capable of causing HDFN ☞ Identify the blood group antibodies that do not cause HDFN Outline and discuss the purpose and process of antenatal screening in the UK Outline and explain reactive and proactive HDFN prevention measures in the UK Outline and discuss the treatment options for HDFN	• Read chapter 15 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 15 • Take part in the eleventh compulsory discussion activity
Month 11	**Learning outcomes**	**Tasks**
18. Quality	Outline and discuss Blood Safety and Quality Regulations (BSQR) legislation Outline the regulatory bodies involved in transfusion Outline, explain and discuss the requirement for a Quality Management System (QMS) Outline, explain and discuss the requirement for Quality Assurance including ☞ Good Manufacturing Practice ☞ Quality Control ☞ Incident reporting ☞ Audit ☞ Change control and validation Discuss haemovigilance with respect to the QMS	• Read chapter 14 • Access the supplementary online materials as directed • Complete the action/ reflection exercises in chapter 14 • Take part in the twelfth compulsory discussion activity
19. Revision	Begin your revision preparation	Revision activities and support will be available online
Month 12	**Learning outcomes**	**Tasks**
20. Revision period	**Preparation for the final examination** You will be directed to revision activities and questions via the online student area.	Revision activities and support will be available online