History of Western Architecture - ARC 362

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List of Buildings

The Ancient World

Egyptian Architecture: Read Chapter 1

- Non-secular (religious) Agrarian Society with slave economy and Pharaoh at the center
- Cultural importance of life, death and the afterlife and how it is expressed in a monumental funerary architecture
- First tombs were called "mastaba" (Arabic: "bench") made of mud brick and grew.
- They were clustered in cemeteries called a necropolis meaning city of the dead
- Preservation of the trappings and riches of life for the afterlife lead to grave robbing and its failure
- Three major periods: Old Kingdom (large pyramids), Middle Kingdom (retreat to hidden cliffs of the Nile), New Kingdom (noted for temples)
- 3000 years of isolation that allowed for a very slow / little development along the Nile River
- Concepts of early pure form, symbolism and the evolution from the mastaba
- Frontality, façade and linear procession to a sacred space of New Kingdom Temples
- Parts of the New Kingdom Temple: Pylon, Peristyle Court, Hypostyle Hall, Sanctuary

Name of Building	**Location City**	**Period (Comment)**
Pyramid of Zoser (or Djoser)	Saqqara, Egypt	Egyptian (Old Kingdom)
Pyramid at Meidum	Meidum, Egypt	Egyptian (Old Kingdom)
Great Pyramids	Giza, Egypt	Egyptian (Old Kingdom)
Great Sphinx	Giza, Egypt	Egyptian (Old Kingdom)
Mortuary temple of Mentuhotep	Deir el-Bahari, Egypt (west Bank of Nile, opposite Luxor)	Egyptian (Middle Kingdom)
Mortuary Temple of Queen Hatshepsut		Egyptian (Start of New Kingdom)
Temple of Khons at Karnak (drawing)	Know the parts	Egyptian (New Kingdom)
Temple of Khons at Karnak	Luxor, Egypt	Egyptian (New Kingdom)
Great Ziggurat	Ur, Iraq	Mesopotamian
Ruins at Persepolis	Persepolis, Iran	Persian

Greek Architecture: Read Chapter 2

- Hellenes were Greek speaking people with common culture and mythology, deeply religious, democratic City-State political unit (each identified with a God); comprising 2 ethnic groups:
    - Dorians: militant society from northern Greece, developed the more rigid;
    - **Doric Order**: Stereobate, Stylobate, Column (Shaft & Capital), Entablature (Architrave, Frieze, Triglyph and Metope, Cornice); Doric Angle Conflict and optical refinements
    - Ionians: mercantile / trading sea faring society from Greek islands and Asia minor, developed the more flexible;
    - **Ionic Order**: Column (Base, Shaft, Capital), Architrave, Dentals, Corona, Sima; Ionic Volute and golden ratio
    - **Corinthian Order**: Used very late in Greek Architecture and is more associated with and used in Roman Architecture. It is a more ornate column order and has its origin in the Ionic Order
- Concepts of idealized beauty and perfection and how it is expressed in the temple (house of the Gods). Developed philosophy, history, drama, literature, democracy, science and math to understand and explain their world.

- The temple was set in the landscape as an object and symbol of perfection, the ritual took place outside but the cult statue was housed inside. One approached on an oblique angle, and was free to walk around.
- The Greeks wanted to understand their place in the cosmos and invented science/math (music rations) to do so. These concepts were also expressed in their architecture
- Greek Building types: Temple, Civic buildings (Stoa – strip shopping) and spaces (Agora – town square), Theaters (Scene, Proscenium, Orchestra, Auditorium)
- Developed grid city planning concepts to colonized southern Italy, Sicily and Asia Minor
- The Acropolis (Greek: "High City") in Athens represents the height of Greek Architecture. Principle buildings include: the Parthenon, Erechtheum, Athena Nike Temple, and the Propylaea (entrance).
- Caryatid: a sculpted female figure serving as an architectural support taking the place of a column or a pillar supporting an entablature on her head

Name of Building	**Location City**	**Period (Comment)**
Doric Column Order	NA / Know the parts	Greek (Doric)
The Basilica or Temple of Hera I	Paestum, Italy	Greek (Doric)
Temple of Poseidon or Hera II	Paestum, Italy	Greek (Doric)
Temple of Concord (Concordia)	Agrigento, Italy	Greek (Doric)
Parthenon (Acropolis)	Athens, Greece	Greek (Doric)
Ionic Column Order	NA / Know the parts	Greek (Ionic)
Temple of Athena Nike (Acropolis)	Athens, Greece	Greek (Ionic)
Erechtheum (Acropolis)	Athens, Greece	Greek (Ionic)
Propylaea (Acropolis)	Athens, Greece	Greek (Doric & Ionic)
Temple of Hephaestus	Athens, Greece	Greek (Doric)
Temple of Olympian Zeus	Athens, Greece	Greek (Corinthian)
Stoa of Attalus	Athens, Greece	Greek (Doric & Ionic)
Odeon of Herodes Atticus	Athens, Greece	Greek
City Planning	NA / Know the concepts	Greek
Comparison of Column Orders	NA	Greek & Roman

Roman Architecture: Read Chapter 3

- First major empire with an autocratic emperor, the empire controls 50-90 million people (approx. 25% of the world's population) and almost 2 billion sq. miles of Europe and Asia Minor and North Africa. The city of Rome has 1.25-1.7 million people at its height with aqueducts that could bring in 350 million gallons of water per day. The scale is unmatched until the Industrial Revolution.
- New and integrated structural concepts of arch and concrete construction, allow for many monumental building types with large interior spaces/spans in Roman Architecture. Brick was used as formwork for concrete and then a thin sheathing of marble applied to finish the building.
- The column orders were (in most cases), not structural and used of decoration only.
- Building types include: Aqueducts and Cisterns, Roads and Bridges, Theaters, Arenas, Circuses, Baths, Forums, Basilicas, Forums, Temples, Palaces, Warehouses, Dams, Defensive Walls, Triumphal Arches, Light Houses, etc.
- The Roman Forum is the Public space (similar to the smaller Greek Agora) and the Roman Basilica was the primary building that abutted the space (similar to the smaller Greek Stoa) except the Basilica had a large arch supported interior civic space.
- Roman architecture was spatially organized, symmetrical and axial that forced the observer along a path to control and dominate them and reinforce the power of the state.
- Symmetry was used to order and organize large building programs such Roman Bath complexes because of the sheer size of the acreage

- Characteristics of Roman Arch include: extravagant, gaudy, showy, colorful, over the top
- The word architecture comes from the knowledge of "arch technology."
- Technologies from the Ancient World:
    - **Egyptians:** Material - Mud Brick and Stone; Structural - Post and Lintel
    - **Greeks:** Material - Marble and Limestone; Structural - Post and Lintel
    - **Romans:** Material – Local material, Mass Produced Bricks, Invented Concrete; Structure – Arch Vaults and Domes to create great interior spaces and infrastructure
- Spatial Comparison from the Ancient World:
    - **Egyptians:** Early Pure Forms that eventually focus on Frontality and Linear Procession of spatial experiences
    - **Greeks:** Objected oriented building, oblique approach, freedom to move around, optical refinements to make more beautiful
    - **Romans:** Organized, Axial, Control and Dominate the Viewer, Impressive Interior Spaces, gaudy to show off power and wealth

Name of Building	Location City	Period (Comment)
Etruscan Temple (Speculative model)	Rome, Italy	Etruscan
Model of Imperial Rome	Rome, Italy	Roman
Roman Arch and Concrete Construction	NA / Know the concepts	Roman
Ten Books on Architecture	10 Books Pub. ca. 30-15 BC	Marcus Vitruvius Pollio
Pont du Gard Aqueduct	Gard, France	Roman (Aqueduct)
Pons Milvius	Rome, Italy	Roman (Bridge)
Theatre of Marcellus	Rome, Italy	Roman (Theater)
Amphitheatre of Pompeii	Pompeii, Italy	Roman (Arena)
Colosseum	Rome, Italy	Roman (Arena)
Circus Maximus	Rome, Italy	Roman (Circus)
Baths of Caracalla	Rome, Italy	Roman (Bath)
Baths of Diocletian	Rome, Italy	Roman (Bath)
Baths of Trajan	Rome, Italy	Roman (Bath)
Temple of Fortuna Virilis	Rome, Italy	Roman (Temple)
Maison Carrée	Nîmes, France	Roman (Temple)
Temple of Vesta (& Vestal Temples)	Rome, Italy	Roman (Temple)
Pantheon	Rome, Italy	Roman (Temple)
Basilica of Trajan	Rome, Italy	Roman (Basilica)
Basilica of Maxentius and Constantine	Rome, Italy	Roman (Basilica)
Roman Forum	Rome, Italy	Roman (Forum)
Trajan's Forum & Column	Rome, Italy	Roman (Forum)
Arch of Titus	Rome, Italy	Roman (Triumphal Arch)
Arch of Constantine	Rome, Italy	Roman (Triumphal Arch)
City Planning of Timgad	Timgad, Algeria	Roman (City Grid / Castrum)
Roman Residences	Pompeii, Italy	Roman (Residences)
Hadrian's Villa	Tivoli, Italy	Roman (Villas)

EXAM 1 *(Bold = required buildings for exam; Italic = additional covered in class but not on slide ID)*

The Middle Ages

Early Christian Architecture: Read Chapter 4

- Rome is in decline, paganism offers no comfort, Christianity is an underground religion
- Edict of Milan in 313 AD by Emperor Constantine legitimizes Christianity followed by First Council of Nicaea in 325 AD standardizes the Christian theology Easter and Canon Law

- Christianity focus on individual salvation and eternal life for all who believe, develops rituals
- Christianity developed in a Roman world and became a Roman creation
- Constantine's architects adopted the basilica for the Church because they were familiar with it and it provided for the indoor rituals. It was also a civic building, not associated with paganism
- Early Christian architecture's use of wood truss ceiling, Latin plan and plain somber rational feel
- Parts of the Basilica: Nave, Aisles, Apse, Colonnade, Clerestory, Catechumens, Wood Truss Roof
- Over time, the interiors became more ornate and the image of Jesus becomes more emperoral

Name of Building	Location City	Period (Comment)
Old Saint Peter's Basilica	Know the parts	Early Christian (Latin Plan)
Old Saint Peter's Basilica	Rome, Italy	Early Christian (Latin Plan)
Church of the Holy Sepulcher	Jerusalem	Early Christian (Latin Plan)
Santa Maria Maggiore	Rome, Italy	Early Christian (Latin Plan)
Santo Stefano Rotondo	Rome, Italy	Early Christian (Central Plan)
Sant' Apollinare in Classe	Near Ravenna, Italy	Early Christian* (Latin Plan)
Hagios Demetrios	Thessaloniki (Salonika), Greece	Early Christian (Latin Plan)

Byzantine Architecture: Read Chapter 4

- 330 AD Constantine moves the capital to Byzantium and renames it Constantinople. The long-term effect was splitting the empire into two, Eastern Empire (lasting 1000 years) and Western Empire (in ruins within less than 200 years and breaks down into small kingdoms).
- Emperor Justinian driving force behind Byzantine
- Byzantine church's central dome, dazzling use of mosaics, symbolic expression, light and emotional feel reflect the difference in ritual function. In the East, the clergy becomes the center of the ritual whereas in the West, the Clergy ritual is separated from the congregation as viewer and actor.
- Structural characteristics include the pendentive dome to force the eye upward to light and the central floating dome above

Name of Building	Location City	Period
Hagia Sophia	Istanbul (Constantinople), Turkey	Byzantine (Central Plan)
San Vitale	Ravenna, Italy	Byzantine (Central Plan)
Sant' Apollinare Nuovo	Ravenna, Italy	Byzantine (Latin Plan)
San Marco	Venice, Italy	Byzantine (Central Plan)

Carolingian (Pre-Romanesque) Architecture: Read Chapter 5

- Western Roman Empire disintegrates by 500 AD into small tribal kingdoms after waves of barbican invasions. Greco Roman culture and language disintegrate into French, Italian, Spanish, German, etc. The classical tradition, arts and laws are lost. The economy is depressed and cities become extinct. Rome shrinks to 50,000 people from over one million.
- Between 500-700 AD little is built. The architectural and construction skills of concrete and arch construction, Hellenic column orders and city planning are lost over many generations.
- The only things that survive are the Roman buildings, the idea of an empire and the Church
- Charlemagne (crowned Holy Roman Emperor 800 AD) forms Franks Germanic kingdom
- Know the concept of Monasticism (cloistered life to preserve and scribe copies of the bible) and how it relates to Carolingian & Romanesque Architecture
- The architectural language becomes flat, simplified and symbolic pattern making, the square bay is used to order the space

Name of Building	Location City	Period
Palatine Chapel	Aachen, Germany	Carolingian
Abbey Church of St. Riquier (destroyed)	Saint-Riquier	Carolingian

St. Michael's Monastery Church	Fulda, Germany	Carolingian
Lorsch Monastery Gatehouse	Lorsch, Germany	Carolingian
Monastery of Saint Gall	St. Gallen, Switzerland	Carolingian

Romanesque Architecture: Read Chapter 5

- After Charlemagne (814 AD), Europe descends into another dark apocalyptic period until 1000 AD when rising economic conditions and social/political order allowed for monumental building
- Know the concept of Monasticism (see above) and how it relates to Romanesque Architecture
- Characteristics of Romanesque include: small rounded arch windows, barrel vault ceiling, lantern at the crossing, square bay, heavy weighty somber feel, no sculpture / plain exterior
- Evolution of the interior nave colonnade from simple pier to more developed
- Know the different sub periods covered (this is not an exclusive list). Northern European: Imperial (early), Norman, High, Late; Italian: Tuscan (Tuscan - Pisan & Florentine - Proto Renaissance)
- Tuscan Romanesque is classically abstract patterns using polychromatic marble unlike Northern European Romanesque

Name of Building	Location City	Period (Comment)
Munster Cathedral	Munster, Germany	Romanesque (Imperial / Early)
Collegiate Church of Saint Gertrude	Nivelles, Belgium	Romanesque (Imperial / Early)
Speyer Cathedral (crypt)	Speyer, Germany	Romanesque (Imperial / Early)
Speyer Cathedral (interior drawing)	Speyer, Germany	Romanesque (Imperial / Early)
Mont-Saint-Michel	Island, Normandy, France	Romanesque (Norman)
Saint-Philibert de Tournus	Tournus, France	Romanesque (Imperial / Early)
Église Saint-Étienne de Nevers	Nevers, France	Romanesque (High)
Abbey Church of Saint-Sernin	Toulouse, France	Romanesque (High)
Benedictine Abbey of St. Pierre (Cluny)	Cluny, France	Romanesque (High)
San Miniato al Monte *(Proto-Renaissance)*	Florence, Italy	Romanesque (Tuscan/Florentine)
Pisa Cathedral	Pisa, Italy	Romanesque (Tuscan/Pisan)
Speyer Cathedral (renovated ceiling)	Speyer, Germany	Romanesque (Late)
Durham Cathedral	Durham, England	Romanesque (Late)
Gloucester Cathedral	Gloucester, England	Romanesque (additions Gothic)

Gothic Architecture: Read Chapter 7

- Goths were a northern tribes that sacked Rome in 410 AD… term coined in the Renaissance
- Know the concept of Scholasticism (creation of new knowledge, scholarship - summa theological and the university to defend Christianity) and how it relates to Gothic Architecture
- Three basic ideas about Gothic: **structural** stone skeleton, **visual art** and the role of line and integration sculpture; and the **role of light** as a canopy and the glass wall
- Know the structural concepts behind Gothic: the point arch, rib vault and flying buttress
- Faith over reason and the emotional/irrational effect
- The façade was a symbolic billboard, the interior shell was where the function took place
- Effects of pointed Arch: looks lighter, move vertical, less lateral loads, can be thinner than regular arch, can have a rectangular bay (Romanesque used square bay with round arch)
- Symbolism: Rose Window = symbolic crown; Embattlements = symbolic defense of the faith; Movement upward = symbolic of the heavens; Skeletal Ribs = metaphorical bones of body of the church; Gargoyles = symbolic of the eval and danger for those who don't believe; Stained Glass = majestic illumination and illustration of God's grace from darkness; Sculpture = to tell the story of saints, martyrs and the passion; Three Deep Portals (with Tympanum) = sacred entrance to the Holy; Sacred Geometry = number symbolism

- French vs. English vs. German vs. Italian Gothic: **French** = compact mass set tightly into dense fabric of medieval city; **English** set on vast lawn allowed for sprawling additions; **German** =: single spire; **Italian** = flat triangular polychromatic black and white façade, lacks height of gothic
- English Gothic has three substyles: Early, Decorated (or Curvilinear) and Perpendicular
- Tracery is the is stonework elements that support the glass in a Gothic window. The term comes from the 'tracing floors' on which the complex patterns of late Gothic windows were laid out.

Monasticism and **Scholasticism** represent two distinct yet related intellectual and spiritual movements in medieval Christianity.

- **Monasticism** (beginning in the 4th century) emphasized *spiritual devotion, ascetic living, and contemplation*. Monks sought closeness to God through prayer, manual labor, and withdrawal from worldly life. Learning in monasteries was largely practical and devotional—focused on Scripture, *copying texts, and moral instruction*.
- **Scholasticism** (flourishing from the 11th to 14th centuries) emerged mainly in cathedral schools and universities. It emphasized *reason, logic, and systematic inquiry* to understand and explain faith. Thinkers like Anselm, Aquinas, and Abelard sought harmony between faith and reason, using philosophy (especially Aristotle) to clarify theology.

Name of Building	Location City	Period
Example of rib vaulting, line and light	Know the concepts	Gothic
Examples of geometry & scholasticism	Know the concepts	Gothic
Examples of rib vaulting & pointed arch	Know the parts	Gothic
Example of flying buttress	Know the parts	Gothic
Cross Section of Gothic Church	Know the parts	Gothic
Examples of rectangular bay and rib	Know the concepts	Gothic
Example of pier development & line	Know the concepts	Gothic
Abbey of St. Denis (nave & elevation)	Saint Denis (near Paris), France	Gothic (Early French)
Sens Cathedral (nave)	Sens, France	Gothic (Early French)
Soissons Cathedral (nave)	Soissons, France	Gothic (Early French)
Laon Catherdral (nave)	Laon, France	Gothic (Early French)
Noyon Cathedral (nave)	Noyon, France	Gothic (Early French)
Notre-Dame Cathedral (nave)	Paris, France	Gothic (Early French)
Chartres Cathedral (nave & elevation)	Chartres, France	Gothic (High French)
Amiens Cathedral (nave)	Amiens, France	Gothic (High French)
Comparative Nave Elevations	Progression of taller	Gothic
Laon Cathedral (elevation)	Laon, France	Gothic (High French)
Notre-Dame Cathedral (elevation)	Paris, France	Gothic (Early French)
Abbey of St. Denis (Tracery nave crossing)	Saint Denis (near Paris), France	Gothic (High French)
Saint-Urbain de Troyes (Tracery)	Troyes, France	Gothic (High French)
Sainte-Chapelle (Tracery)	Paris France	Gothic (High French)
Notre-Dame Cathedral (Tracery)	Paris France	Gothic (High French)
Salisbury Cathedral	Salisbury, England	Gothic (Early English)
Wells Cathedral	Wells, England	Gothic (Decorated English)
Kings College Chapel	Cambridge University, England	Gothic (Perpendicular Eng.)
Ulm Cathedral	Ulm, Germany	Gothic (German)
Strasbourg Cathedral	Strasbourg, France	Gothic (Late)
Medieval City Planning, Florence Italy	Know the concepts	Gothic/Medieval
Palazzo Vecchio	Florence, Italy	Gothic/Medieval
Florence Cathedral (Il Duomo)	Florence, Italy	Gothic (Italian)

Basilica di Santa Croce	Florence, Italy	Gothic (Italian)
Medieval City Planning, Senia Italy	Know the concepts	Medieval
Piazza del Campo & Palazzo Pubblico	Siena, Italy	Medieval
Siena Cathedral	Siena, Italy	Gothic (Italian)
Milan Cathedral	Milan, Italy	Gothic (Italian)

EXAM 2 *(Bold = required buildings for exam; Italic = additional covered in class but not on slide ID)*

The Renaissance and the Baroque

Somber & Rational (appeals to the mind)	Dazzling & Irrational (appeals to the emotion)
• ***Early Christian***	• ***Byzantine***
• ***Romanesque***	• ***Gothic***
• ***Renaissance***	• ***Baroque***
• ***Modern***	• ***Post-Modern***

Renaissance Architecture: Read Chapter 8

- Rebirth of the classical past, the Age of Reason, the Humanist and the Individual
- The architect becomes important and is known from hereon in
- A reaction to the corruption of the Middle Ages, language, ideas and darkness
- Renaissance based on: 1. Spiritual and intellectual autonomy of the individual; 2. Power of human reason; 3. Freedom from dependence on the supernatural.
- Creates a conflict with medieval theological system
- Humanist is not atheistic or heretical, they wanted to reconcile ancient Greek ideals with Christian ideals. Humanist were interested in technology, science and mathematics
- Renaissance was founded in Italy among the ruins of classical Rome and as far away from the center of Gothic Europe (France, Germany and England); starting in Florence in 1420
- Renaissance architecture is mathematically based and rational using the classical language. It starts off flat and becomes more three dimensional until fully classical.
- Mannerism is Late Renaissance (Leonardo da Vinci, Raphael, and Michelangelo) that exaggerates qualities such as compositional tension and instability over balance and clarity.
- Know the evolution of Papal Basilica of St. Peter and Piazza / Square and designers (Bramante, Michelangelo , Maderno, Bernini) and their contribution

Renaissance Architects:

- **Filippo Brunelleschi** (1377 – April 15, 1446) was an Italian designer and architect. He is recognized to be the first modern engineer, planner and sole construction supervisor. He is the founding fathers of the Renaissance. He is known for developing a technique for linear perspective in art. His most important work is the building of the dome of the Florence Cathedral. In addition to architecture, he is known for works in sculpture, mathematics, engineering, and ship design. All of his principal works are in Florence, Italy
- **Leon Battista Alberti** (February 14, 1404 – April 25, 1472) was an Italian humanist author, artist, architect, poet, priest, linguist, philosopher and cryptographer; he epitomized the Renaissance Man. He was a theorist who published an architectural treatise titled, *On the Art of Building*
- **Donato Bramante** (1444 – 11 April 1514), was an Italian architect. His Tempietto (San Pietro in Montorio) marked the beginning of the High Renaissance in Rome (1502).
- **Michelangelo Buonarroti** (6 March 1475 – 18 February 1564) was an Italian sculptor, painter, architect and poet of the High Renaissance and defined Mannerism as a style. Considered by many the one of the greatest artist of all time. Michelangelo's works of painting, sculpture and architecture rank among the most famous in existence that he is often considered the archetypal Renaissance man.

- **Andrea Palladio** (30 November 1508 – 19 August 1580) was an Italian architect active in the Veneto valley. He was influenced by Roman and Greek architecture, and the writings of Vitruvius. He is considered to be one of the most influential individuals in the history of architecture (and has the greatest lasting influence) from the publication of his architectural treatise, *The Four Books of Architecture*.

Name of Building	Location City	Architect
Linear Perspective (know concepts)	Florence, Italy	Filippo Brunelleschi
Il Duomo (Dome of Florence Cathedral)	Florence, Italy	Filippo Brunelleschi
Ospedale (Hospital) degli Innocenti	Florence, Italy	Filippo Brunelleschi
Old Sacristy (Sagrestia Vecchia)	Florence, Italy	Filippo Brunelleschi
Basilica di San Lorenzo	Florence, Italy	Filippo Brunelleschi
Pazzi Chapel at Santa Croce	Florence, Italy	Filippo Brunelleschi
De re aedificatoria (On the Art of Building)	10 Books, 1443-52, Pub. 1485	Leon Battista Alberti
Palazzo Rucellai	Florence, Italy	Leon Battista Alberti
Santa Maria Novella	Florence, Italy	Leon Battista Alberti
San Francesco (Tempio Malatestiano)	Rimini, Italy	Leon Battista Alberti
Basilica of Sant' Andrea	Mantua, Italy	Leon Battista Alberti
Tempietto (at San Pietro in Montorio)	Rome, Italy	Donato Bramante
Cortile del Belvedere, (**Belvedere Court)**	Rome, Italy	Donato Bramante
Papal Basilica of St. Peter (1st design)	Vatican, Rome, Italy	Donato Bramante
Villa Giulia	Rome, Italy	Baldassare Peruzzi
Palazzo Massimo alle Colonne	Rome, Italy	Baldassare Peruzzi
Self Portrait, ex. of painting & sculpture		Michelangelo Buonarroti
New Sacristy, Medici Chapel	Florence, Italy	Michelangelo Buonarroti
Laurentian Library, San Lorenzo	Florence, Italy	Michelangelo Buonarroti
Capitoline Hill (Piazza del Campidoglio)	Rome, Italy	Michelangelo Buonarroti
Papal Basilica of St. Peter (2nd design)	Rome, Italy	Michelangelo Buonarroti
Palazzo Farnese	Rome, Italy	Michelangelo Buonarroti
The Four Books of Architecture	4 Books, Pub. 1570, Venice	Andrea Palladio
Basilica Palladiana (Palazzo della Ragione)	Vicenza, Italy	Andrea Palladio
Palazzo Chiericati	Vicenza, Italy	Andrea Palladio
Villa La Rotonda	Vicenza, Italy	Andrea Palladio
Villa Foscari	Vicenza, Italy	Andrea Palladio
Palazzo Porto Breganze	Vicenza, Italy	Andrea Palladio
San Giorgio Maggiore	Venice, Italy	Andrea Palladio

Baroque Architecture: Read Chapter 9

Basic Concepts and Italian Baroque

- Begins in Rome in the 16th Century and stems from the Italian Renaissance
- Literal translation of Baroque is bizarre, grotesque, irregular, and perverse
- It's about architectural theater, interpenetration of elements, exuberance and flamboyance, spectacular and theatrical, stagecraft and illusion, drama and visionary, greater than life, opulent use of ornament, ornate, dramatic use of light, blending of painting, sculpture and architecture
- Architecture focuses on the spectator, churches become theaters to generate religious emotion where the drama of the miraculous visions, heroic martyrdom and history of Christianity is told
- More religious buildings built during the Baroque than any time before in Christian history

- Council of Trent 1545-63 to counter the Protestant Reformation focuses on doctrinal changes that lead to a spiritual renewal in painting, sculpture, architecture and urbanism of great physical splendor, lavish in size and spectacular in program to convince one of the Church's authority
- At the same time, the growth of science (mathematics, reason and humanism) leads to a conflict with scholastic theology and church thinking. Ironically, the science of motion (i.e., Galileo and Newton) becomes the element of motion in architecture, sculpture and painting
- Italian Baroque starts with high relief towards the center by Maderno and moves into three-dimensional undulation

French Baroque

- French Garden as stage set and ability to control nature on a vast unprecedented scale, expansive spaces, limitless vistas, dramatic contrast, of light and dark, symmetrical pools, varied levels of movement, controlled, rigorous, intellectual. This is different than the 15th century Italian Renaissance Garden, which tried to rationally order nature through geometric patterns or the 18th century English garden which tries to be better that nature as a romantic painting.
- Architecture is more classical, less the Italian flamboyant form of Baroque. Defined as a cool cerebral character (not playful, more disciplined), with later work being more three-dimensional in massing vs. an undulating of surfaces and geometries of the Italian Baroque

English Baroque

- England never really goes the Renaissance architecturally, Gothic was the rule. During the Baroque period, England stylistically goes through a more limited classical Renaissance with the work of Inigo Jones and Christopher Wren. Their work moves English Gothic to Classical for a short period which leads to a new 18th century style called Palladian Revival, then Georgian and eventually to the 19th century Neo Classical Style.

Baroque Architects:

• **Carlo Maderno** (1556 – January 30, 1629) was an Italian architect whose work marks the transition from the Renaissance to the Baroque. He is best known for completing the façade of St. Peter's Basilica in Rome and for his design of Santa Susanna, which set the model for Baroque church façades.

• **Gian Lorenzo Bernini** (December 7, 1598 – November 28, 1680) was an Italian sculptor, architect, and painter. A leading figure of the Baroque, he brought dramatic emotion and theatricality to architecture and sculpture. His major works include St. Peter's Square and the Baldachin in St. Peter's Basilica, Rome. He is considered the best sculptor in marble of all time and the term virtuoso was coined to describe his work.

• **Francesco Borromini** (September 25, 1599 – August 3, 1667) was an Italian architect who introduced complex geometries and dynamic spatial forms to Baroque architecture. His most famous works include San Carlo alle Quattro Fontane and Sant'Ivo alla Sapienza in Rome. He was a rival architect to Bernini but never attained the same fame. He died by suicide.

• **Guarino Guarini** (January 17, 1624 – March 6, 1683) was an Italian Theatine priest, mathematician, and architect. He worked mainly in Turin and is known for bold structural innovations and elaborate geometries, seen in the Chapel of the Holy Shroud and the Church of San Lorenzo.

• Pietro da Cortona (November 1, 1596 – May 16, 1669) was an Italian Baroque painter and architect. His architecture features rich ornament and grandeur, exemplified in the Church of Santi Luca e Martina and the Palazzo Barberini in Rome.

• **Francesco de Sanctis** (1679 – 1731) was an Italian architect best known for designing the Spanish Steps (1723–1726) in Rome, a masterful urban composition linking the Piazza di Spagna with the Trinità dei Monti.

• **Nicola Salvi** (August 6, 1697 – February 8, 1751) was an Italian architect and sculptor remembered for designing Rome's Trevi Fountain, completed after his death. His work combines architecture, sculpture, and water in grand theatrical form.

• **François Mansart** (January 23, 1598 – September 23, 1666) was a French architect known for introducing classical Baroque style to France. He emphasized harmony and proportion in works such as Château de Maisons and popularized the "Mansard roof."
• **Louis Le Vau** (1612 – October 11, 1670) was a French architect who served as principal architect to Louis XIV. His major works include the Palace of Versailles (early phases), the Château de Vaux-le-Vicomte, and additions to the Louvre.
• **André Le Nôtre** (March 12, 1613 – September 15, 1700) was a French landscape architect who designed the gardens of Versailles, Vaux-le-Vicomte, and the Tuileries. He defined the formal French garden style characterized by symmetry, axial planning, and grandeur.
• **Claude Perrault** (September 25, 1613 – October 9, 1688) was a French architect, scientist and medical doctor best known for designing the east façade of the Louvre, known as the "Colonnade." His work reflects rational order and classical restraint within the Baroque period.
• **Inigo Jones** (July 15, 1573 – June 21, 1652) was an English architect who introduced classical Palladian architecture to England. His key works include the Queen's House in Greenwich and the Banqueting House at Whitehall.
• **Sir Christopher Wren** (October 20, 1632 – February 25, 1723) was an English architect, mathematician, and scientist. After the Great Fire of London, he rebuilt over 50 churches, including St. Paul's Cathedral, blending Baroque grandeur with classical harmony.

Landscape Garden Design Comparison:
Italian Renaissance Garden (15th–16th c.)

- Emphasized *order, proportion, and harmony* inspired by classical ideals and geometric order from the medieval chaos.
- Gardens were *terraced* and *geometrically organized*, integrating architecture, sculpture, and water features.
- They framed views of the surrounding landscape (*villa + garden as a unified composition*).
- Example: *Villa d'Este* and *Villa Lante*.
- Symbolized human control over nature through rational design.

French Baroque Garden (17th c.)

- Expanded Renaissance geometry into *grand scale and strict axial symmetry*.
- Used long vistas, radiating avenues, and formal parterres to project *absolute order and power*, mirroring the monarchy (e.g., Louis XIV).
- Architecture and landscape merged into one theatrical display of dominance over nature into a spatial theater.
- Example: *Versailles* by André Le Nôtre.
- Symbolized political control and cosmic order under royal authority.

English Landscape Garden (18th c.)

- Rejected the rigid formality of the Baroque in favor of *naturalism and picturesque beauty*.
- Featured rolling lawns, irregular lakes, clusters of trees, and winding paths designed to look *"natural" but carefully composed*.
- Influenced by romantic ideals and painters like Claude Lorrain.
- Example: *Stowe* and *Stourhead*.
- Symbolized harmony with nature, individual liberty, and pastoral simplicity.

In summary:

• The *Italian* Garden celebrates human reason, harmony and geometric order;
• The *French* Garden glorifies power, control and spatial movement;
• The *English* Garden values natural beauty and organic freedom.

Italian Baroque

Name of Building	Location City	Architect
Church of the Gesù (1st Baroque façade)	Rome, Italy	Giacomo della Porta
Santa Susanna	Rome, Italy	Carlo Maderno
Papal Basilica of St. Peter (Façade)	Rome, Italy	Carlo Maderno
Sant'Andrea della Valle	Rome, Italy	Carlo Maderno
Self Portrait and works of sculpture	Illustration	Gian Lorenzo Bernini
Sant' Andrea al Quirinale	Rome, Italy	Gian Lorenzo Bernini
Cornaro Chapel, (Ecstasy of Saint Teresa)	Rome, Italy	Gian Lorenzo Bernini
Santa Maria della Vittoria	Rome, Italy	Carlo Maderno
Baldacchino (Papal Basilica of St. Peter)	Rome, Italy	Gian Lorenzo Bernini
Piazza San Pietro (St. Peter's Square)	Rome, Italy	Gian Lorenzo Bernini
Portrait	Illustration	Francesco Borromini
San Carlo alle Quattro Fontane	Rome, Italy	Francesco Borromini
Sant' Ivo alla Sapienza	Rome, Italy	Francesco Borromini
Oratorio dei Filippini (Saint Philip) Neri	Rome, Italy	Francesco Borromini
Chiesa di San Lorenzo	Turin, Italy	Guarino Guarini
Chapel of the Holy Shroud (Sacra Sindone)	Turin, Italy	Guarino Guarini
Self Portrait and works of painting	Illustration	Pietro da Cortona
Santa Maria della Pace	Rome, Italy	Pietro da Cortona
Spanish Steps	Rome, Italy	Francesco de Sanctis
Trevi Fountain	Rome, Italy	Nicola Salvi

French Baroque

Name of Building	Location City	Architect
Portrait and Mansard Roof	Know concepts	François Mansart
Orleans Wing, Château de Blois	Blois, France	François Mansart
Sainte Marie de la Visitation	Paris, France	François Mansart
Château de Vaux-le-Vicomte (Building)	Maincy, France	Louis Le Vau
Château de Vaux-le-Vicomte (Gardens)	Maincy, France	André le Nôtre
Palace of Versailles	Versailles, France	Louis Le Vau (& others)
Gardens of Versailles	Versailles, France	André le Nôtre
East wing of the Louvre	Paris, France	Claude Perrault

English Baroque

Name of Building	Location City	Architect
Queen's Chapel, St. James Palace	London, England	Inigo Jones
Gateway, (relocated to) Chiswick House	London, England	Inigo Jones
St Paul's Cathedral	London, England	Christopher Wren

EXAM 3 *(Bold = required buildings for exam; Italic = additional covered in class but not on slide ID)*

The Modern World

Eighteenth Century Architecture: Read Chapter 10

- Age of Enlightenment, an Intellectual Revolution, the idea of social and political change
- A change in consciousness emphasizing reason (Rationalism) and individualism rather than existing social order and theological understanding of the past (Romanticism)
- Philosophers John Locke (politics - men are born free), Jean-Jacques Rousseau (politics – The Social Contract, government comes from the people: democracy) and Adams Smith (economics – The

Wealth of Nations) advance theories about social and economic order and a rational society that lead to the American and French Revolution

- Romanticism to counter and push back on the idea of change (reaction against Rationalism). Romanticism wants to go back to the good old days, escape into a romantic fantasy world, an idealized vision of distant times and places.
- Rationalism vs. Romanticism: what style do we build in and what does it mean?
- All styles become available to satisfy the many moods, tastes, and needs in a volatile world of change. Nothing is new, all styles come from the past and have political, economic, social and cultural meaning
- This period marks the start of modern architectural scholarship driven by the need for knowledge of different styles. The social science of modern Archeology is founded, driven by the excavation of Pompeii and Herculaneum.
- Move away from the science of geometry as a main ordering and organizing element that underpins architecture and toward the language of style and meaning. The concept was started by Claude Perrault in the 17th century with his theory of positive beauty (based on classical ordering principles, i.e., geometry, rules) and arbitrary beauty (beauty is in the eye of the beholder and relative to a particular situation, based on human values, it's subjective, i.e., like things natural or by cultural consensus).

Comparison	Rationalism	Romanticism
 **The Architect's Dream** 1840 oil painting by Thomas Cole for New York architect Ithiel Town Cole incorporated pieces of architecture from Egyptian, Greek and Roman on one side of the river / divide (enlightened) vs. Gothic (in the dark) on the other side	• Enlightened	• In the Dark
	• Classical	• Gothic
	• Forward thinking	• Return to the Past
	• Whig Party	• Tory Party
	• Democracy	• Monarchy
	• Capitalism	• Feudalism
	• Business / Mercantile	• Land Owner
	• Science	• Religion
	• Origins in Greek Thought	• Origins in Scholasticism
	• Rational	• Emotional
	• Anti-Baroque	• Baroque
	• Realist - Neo-Classicism - Pure Form	• Escapist / Fantasy - Mysterious Gothic - Poetic Classicism - Exotic East

Rationalism and Romanticism in England

- Palladian Revival (Palladian) - Rationalism
- Archaeological Neo-Classicism (Archae N/C) - Romanticism
- Gothic Revival (Goth Rev.) - Romanticism
- English Landscape Garden (Eng. Garden) - Romanticism
- High Picturesque Style (High Pict.) - Romanticism
- Urban Planning (U. Planning) - Rationalism

Name of Building	Location City	Style	Architect
Chiswick House	London, England	Palladian	Richard Boyle (aka 3rd Earl of Burlington and 4th Earl of Cork)
Holkham Hall	Holkham, England	Palladian	
Assembly Rooms	York, England	Palladian	

Etchings of Rome & Fictitious Prisons	Drawings	Archae N/C	Giambattista Piranesi
Strawberry Hill	Twickenham, England	Gothic Rev.	Robert Adams & others
Fonthill Abbey	Fonthill, England	Gothic Rev.	James Wyatt
Coast View of Delos with Aeneas	Painting	Baroque	Claude Lorraine
Sourhead Park	Wiltshire, England	Eng. Garden	Henry Flitchcroft
Cronkhill	Shropshire, England	High Pict.	John Nash
Royal Pavilion	Brighton, England	High Pict.	John Nash
Royal Crescent	Bath, England	U. Planning	John Nash
Cumberland Terrace	London, England	U. Planning	John Nash
Regent Street	London, England	U. Planning	John Nash

Rationalism and Romanticism in France

- Structural Neo-Classicism (Struct'l N/C) – Rationalism the work of Jacques-Germain Soufflot
- Radical Neo-Classicism (Radical N/C) - Rationalism
- Revolutionary / Visionary Neo-Classicism (Revol./Vis.) - Rationalism / Irrational Romanticism
    - Claude-Nicolas Ledoux (1736-1806): known for ideal and utopian projects intended to improve society. Many works are built and some remain drawings of ideas. The phrase **Architecture parlante** ("speaking architecture") is architecture that explains its own function or identity. It was originally associated with Claude-Nicolas Ledoux
    - Étienne-Louis Boullée (1728-1799): visionary who did mostly drawings and had a great love of painting. He has a mid-life crisis and quits architecture to paint architectural visions, expressive pictures (similar to Piranesi), with pure elementary shapes (pyramid, cube, cylinder, cone, sphere) and reductive stripped-down classical elements

Name of Building	Location City	Style	Architect
Pantheon	Paris, France	Struct'l N/C	Jacques-Germain Soufflot
Theater of France (Théâtre de l'Odéon)	Paris, France	Radical N/C	Marie-Joseph Peyre
School of Medicine (Descartes Univ.)	Paris, France	Radical N/C	Jacques Gondouin
Prison of Aix-en-Provence	Paper Project / Ideal	Revol./Vis.	Claude-Nicolas Ledoux
Inspector's House Water Works	Paper Project / Ideal	Revol./Vis.	Claude-Nicolas Ledoux
Ideal Form Projects	Paper Project / Ideal	Revol./Vis.	Claude-Nicolas Ledoux
Royal Saltworks (Ideal Plan)	Arc-et-Senans, France	Revol./Vis.	Claude-Nicolas Ledoux
Director's House, Royal Saltworks	Arc-et-Senans, France	Revol./Vis.	Claude-Nicolas Ledoux
Gate House, Royal Saltworks	Arc-et-Senans, France	Revol./Vis.	Claude-Nicolas Ledoux
Barrière (Tollgates) Projects	Around Paris, France	Revol./Vis.	Claude-Nicolas Ledoux
Barrière De La Vilette	Paris, France	Revol./Vis.	Claude-Nicolas Ledoux
Coopers Workshop Project	Paper Project / Ideal	Revol./Vis.	Claude-Nicolas Ledoux
Temple of Love Project	Paper Project / Ideal	Revol./Vis.	Claude-Nicolas Ledoux
Metropolitan Cathedral	Paper Project / Ideal	Revol./Vis.	Étienne-Louis Boullée
Newton's Cenotaph	Paper Project / Ideal	Revol./Vis.	Étienne-Louis Boullée
Pyramid Projects	Paper Project / Ideal	Revol./Vis.	Étienne-Louis Boullée
Other Projects	Paper Project / Ideal	Revol./Vis.	Étienne-Louis Boullée

Romantic "Gothic Neoclassical Style" in England

- Sloane's work is hard to categorize and put into a style (the problem with diverse use of styles)

Name of Building	Location City	Style	Architect
Bank of England	London, England		John Sloane
Breakfast Parlor	London, England		John Sloane

Nineteenth Century Architecture: Read Chapter 11

- 19th Century can be thought of as the **conflict** between Conservativism and the mounting forces of change; the struggle between tradition and innovation. The 19th Century was driven by the Industrial Revolution whereas the 18th Century was driven by an Intellectual Revolution. The consequences were an avalanche of change and a feeling of being out of control.
- This **conflict** produced intensified class struggle, great social and economic flux, status of the middle class grew, aristocracy becomes less powerful, lower class are uprooted from the farm and mass migration to the city, the growth of cities and creation of unemployment. The French Revolution, Napoleonic Wars and great loss of life all contribute to this feeling of great social change and despair.
- The Congress of Vienna in 1815 tried to turn back the hands of time and restore the French Monarchy. Sociopolitical and intellectual institutions of the 19th century became obsessively preoccupied with history. The past became a tangible, fixed anchor in a world of change, i.e., "the good old days."
- This social and economic **conflict** is played out in the new areas of knowledge: Georg Wilhelm Friedrich Hegel (truth found not in reason but a matter of process, history and conflict); Charles Darwin (evolution and the conflict of the species); Karl Marx (political economist and class conflict); Sigmund Freud (conflict between the conscious and unconscious, rational and irrational).
- Battle of the styles, "In what style should be build?" Historical styles were architectural works and technological (large span) feats were engineering works.

International Neoclassicism (Georgian Style in the US)

- Beginning in the mid-18th century. Neoclassicism became an international style principally derived from the architecture of classical antiquity, the Vitruvian principles in The Ten Books on Architecture, and the work of the Italian architect Andrea Palladio through his publication of The Four Books on Architecture. Earlier styles after the Baroque include Palladian Revival in England that later became Georgian Architecture / Colonial Revival in the United States.
- **Karl Friedrich Schinkel** (13 March 1781 - 9 October 1841) was a Prussian architect, city planner, and painter. He designed in many styles including Neo-classical and Neo-gothic. Most of his famous buildings are found in and around Berlin.
- **Leo von Klenze** (29 February 1784 - 26 January 1864) was a Bavarian architect, painter and writer. He was noted for Greek revival style within Neoclassicism.
- **Alexander Thompson** (9 April 1817 – 22 March 1875) was an eminent Scottish architect and architectural theorist. He mixed Egyptian, Greek and Roman revival styles.
- **Thomas Jefferson** (April 13, 1743 – July 4, 1826) was primarily noted for being the author of the Declaration of Independence and President of the United States. He was self-taught architect and owned a copy of Palladio's The Four Books on Architecture. His designed in the Neo-Classical / Neo-Palladian / Georgian style that some have defined as Jeffersonian Architecture.

Name of Building	Location City	Architect
Arc de Triomphe	Paris, France	Jean Chalgrin
Portrait (1836) and Paintings	Illustration	Karl Friedrich Schinkel
Schauspielhaus (Theater House) Berlin	Berlin, Germany	Karl Friedrich Schinkel
Altes Museum	Berlin, Germany	Karl Friedrich Schinkel
Charlottenhof Palace	Potsdam, Germany	Karl Friedrich Schinkel
Friedrichswerder Church (Neo-Gothic)	Berlin, Germany	Karl Friedrich Schinkel
Portrait (1856)	Illustration	Leo von Klenze
Walhalla (Hall to German Worthies)	Regensburg, Germany	Leo von Klenze
Propylaea	Munich, Germany	Leo von Klenze
Ruhmeshalle (hall of fame)	Munich, Germany	Leo von Klenze

British Museum	London, England	Sir Robert Smirke
Portrait (c. 1860)	Illustration	Alexander Thomson
Queens Park Presbyterian Church	Glasgow, Scotland	Alexander Thomson
Caledonia Road Presbyterian Church	Glasgow, Scotland	Alexander Thomson
Vincent Street Presbyterian Church	Glasgow, Scotland	Alexander Thomson
Presidential Portrait (1800)	Illustration	Thomas Jefferson
Monticello	Charlottesville, Virginia	Thomas Jefferson
Virginia State House	Richmond, Virginia	Thomas Jefferson
The Rotunda (University of Virginia)	Charlottesville, Virginia	Thomas Jefferson

École des Beaux-Arts

- School of Fine Arts in Paris, opened 1819 and closed in 1968.
- Goals: 1. Established universal architectural ideals; 2. Study the 5 column orders; 3. Study Roman and Renaissance architecture; 4. Study French Classicism
- Design Principles: 1. Abstract and Conceptual (plan and hierarchy); 2. Functional and Experiential (procession / movement thru)
- The greatest project of its time that embody this style is Paris Opera House (Palais Garnier) by Charles Garnier. The building program is solved through a complex circulatory system to allow movement through the building in "a social" assembly line fashion within the aesthetic significance of high French classical tastes as a cultural symbol. This work became the model for other complex programs (i.e., railway stations) where movement through the building is a key function and yet the exterior aesthetic reflects its cultural significance.
- Many 19th Century American Architects are trained at the École including: Richard Morris Hunt; McKim Mead & White; Henry Hobson Richardson; Warren and Wetmore, Burnham and Root; Carrère and Hastings; Ernest Flagg; and Cass Gilbert

Name of Building	Location City	Architect
Paris Opera House (Palais Garnier)	Paris, France	Charles Garnier
Villard Houses	New York, New York	McKim, Mead & White
The Breakers	Newport, Rhode Island	Richard Morris Hunt
Metropolitan Museum of Art	New York, New York	Richard Morris Hunt
Low Memorial Library, Columbia Univ.	New York, New York	McKim, Mead & White
Grand Central Terminal (Façade)	New York, New York	Warren & Wetmore

Victorian Gothic

- Victorian architecture includes a number of revival styles during the mid-late 19th century around the reign of Queen Victoria (1837-1901).
- **Augustus Welby Northmore Pugin (**1 March 1812 – 14 September 1852) was an English architect, designer, artist, and critic who is principally remembered for his pioneering role in the Victorian Gothic style. Pugin argued that architecture must speak the truth and for England that was Gothic. The Gothic pointer arch was the most efficient form and should be expressed.
- **Henry Hobson Richardson** (September 29, 1838 – April 27, 1886) was an American architect who studied at Harvard College, Tulane University, and École des Beaux Arts. His style was so unique that is was popularized as Richardsonian Romanesque (round windows vs. pointed arch). Along with Louis Sullivan and Frank Lloyd Wright, Richardson is one of "the recognized trinity of American architecture," outside of 19th Century influenced European Classicism.

Name of Building	Location City	Architect
Portrait	Illustration	A.W.N. Pugin
Houses of Parliament	London, England	A.W.N. Pugin & Charles Barry

St. Wilfrid's Church	Manchester, England	A.W.N. Pugin
All Saints, Margaret Street	London, England	William Butterfield
Manchester Town Hall	Manchester, England	Alfred Waterhouse
Portrait (1886)	Illustration	Henry Hobson Richardson
Allegheny County Courthouse	Pittsburgh, Pennsylvania	Henry Hobson Richardson
Trinity Church	Boston, Massachusetts	Henry Hobson Richardson
Thomas Crane Public Library	Quincy, Massachusetts	Henry Hobson Richardson
Pennsylvania Academy of Fine Arts	Philadelphia, Pennsylvania	Frank Furness & Geo. Hewitt

Architecture of Technology

- Industrial Revolution is based on Movement (division of labor through specialization), Standardization (mass product the same part and size) and the Assembly Line (the combination of the two in a timed sequence).
- Mass projection of steel leads to new building technology of steel frame and reinforced concrete construction. Prior to the 19th century, monumental construction was stone, masonry, and concrete with post, lintel and arch structural systems.
- Production of Iron goes from 825,000 tons in 1800, to 1,825,00 tons in 1830 to 40,000,000 tons in 1900 (a 50-fold increase). Prior to the 19th century, there were only military engineers for bridges and forts, after this time, Civil (Civilian) Engineering becomes a profession to solve non-military structures. Engineering goes from an empirical design (past experience / table) method to a scientific (calculated formula) method.
- Three new concepts lead to tall buildings at the end of the 19th Century: steel frame and curtain wall construction (to build higher than masonry construction allows), invention of the elevator (to move people up beyond a 5-6 stories of stair climbing limit) and creation of the electric railroad transportation system / subway, (to bring people from further away to allow the density of tall buildings to be profitable).

Name of Building	**Location City**	**Architect**
Reinforced Concrete and Steel Truss	Illustration	
Factory design showing Iron in tension	Illustration	James Bogardus
254-260 Canal Street (Cast Iron Façade)	New York, New York	James Bogardus
Coalbrookdale Bridge (1779)	Coalbrookdale, England	Abraham Darby
Brooklyn Bridge (1883)	New York, New York	John & Washington Roebling
Eiffel Tower (1889)	Paris, France	Gustave Eiffel
Statue of Liberty (1886)	New York, New York	Gustave Eiffel
Garabit Viaduct (1880)	Ruynes-en-Margeride, France	Gustave Eiffel
Forth Rail Bridge (1882)	Edinburgh, Scotland	Sir Benjamin Baker
St. Pancras Railway Station (Back - Shed)	London, England	William Henry Barlow
St. Pancras Railway Station (Front - V.Gothic)	London, England	William Henry Barlow
Grand Central Terminal (Back - Shed)	New York, New York	Warren & Wetmore
Grand Central Terminal (Front - Beaux-Arts)	New York, New York	Warren & Wetmore
Bibliothèque Sainte-Geneviève (Int. Struct. Exp.)	Paris, France	Henri Labrouste
Bibliothèque Sainte-Geneviève (Ext. Beaux-Arts.)	Paris, France	Henri Labrouste
The Crystal Palace, (1851 Great Exposition)	Hyde Park, London, England	Joseph Paxton
Galerie des machines (1889 Exposition)	Paris, France	Ferdinand Dutert

EXAM 4 *(Bold = required buildings for exam; Italic = additional covered in class but not on slide ID)*

Twentieth Century Architecture: Read Chapter 12 – Not on the Exam (*theories covered in ARC350W***).**