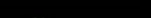


Hannes Meyer, Hans Wittwer, Peterschule proposal, Basel, 1926



Not I, monologue, Samuel Beckett, 1973

On or about December 1910, human character changed. I am not saying that one went out, as one might into a garden, and there saw that a rose had flowered, or that a hen had laid an egg. The change was not sudden and definite like that. But a change there was, nevertheless; and, since one must be arbitrary, let us date it about the year 1910. The first signs of it are recorded in the books of Samuel Butler, in the *Way of All Flesh* in particular; the plays of Bernard Shaw continue to record it. [...] All human relations have shifted— those between masters and servants, husbands and wives, parents and children. And when human relations change there is at the same time a change in religion, conduct, politics and literature.

Historian Erwin Panofsky characterized developing knowledge as an archipelago of ideas. Panofsky's oft-quoted comment observed that in-progress work 'tends to resemble an archipelago of little islands forming, perhaps, a coherent pattern when viewed from an airplane...' [Erwin Panofsky, *Meaning in the Visual Arts*, Papers in and on Art History (1955) p 340.]

This in turn recalls philosopher Jurgen Habermas' phrase and position—he described modernity as an unfinished or incomplete project. This contrasted with the views of another philosopher connected with the term post-modernity, Jean-François Lyotard, who disagreed with the idea of modernity as an unfinished or incomplete project—he wrote of a multi-layered idea, of re-writing modernity, in an essay entitled '*Réécrire la modernité*'. The contemporary reworking and re-enacting of key moments of modernity present challenges to identifying what is authentically modern.

French writer Jacques Attali reflected on the meaning of the term modern, declaring the word's meaning to be inherently unstable, continuously changing over time. Concepts and practices of the modern evolve constantly. The Bauhaus is perceived as an original site of production of modern form. Yet the Bauhaus began in the context of the arts and crafts movement, connected with German Expressionism. Gropius realigned with the New Objectivist (*Neue Sachlichkeit*) movement. Moholy-Nagy claimed he remotely ordered enamel works of art in 1923, presaging the technocratic 'New Realist' art of Yves Klein in the 1950s, and widespread conceptualism of the 1960s.

Modern architecture and urbanism issued from inter-related sources. In the European context, the 1851 Crystal Palace by Joseph Paxton, a large temporary glass edifice, an assemblage of dry construction, demonstrated new, rapid, effective ways to create built form to house and display industrially produced wares. At the scale of the metropolis, Haussmann restructured Paris from 1853 to 1870, slicing through existing city, at grade, and below ground, restructuring the monumental axes to work with a radio-concentric, centralized form, and installing infrastructure to make collective space liveable and inhabitable. The population of nineteenth century Paris swelled and filled with small-scale, artisanal industry. Novelist Emile Zola described how the city teemed with artisans' workshops and studios for painting, sculpture and photography.

In America, the Great Chicago Fire of 1871 created vacant, buildable lots in the city centre of Chicago. A building boom after a depression (1873-9), created new, block-scaled footprints for outstanding new tall urban buildings with elevators, such as the Monadnock block of 1891, its north half by Burnham and Root, and the south end by Holabird and Roche, and the Reliance building of 1890 by Daniel Burnham. The structure of the first tall building, by William LeBaron Jenney, the Home Insurance building of 1885, used steel rather than cast iron, the Montauk building by Daniel Burnham and John Wellborn Root, Sr. of 1882-3 used structural steel glass and terra cotta skin.

Albert Kahn practiced with his brother Julius, designing vast factories in Detroit, beginning with the reinforced concrete Packard Motor Car Company of 1903, and continuing with Ford factories. Gropius published photographs and wrote, in 'The Development of Industrial Buildings', of the formal qualities of reinforced concrete North American grain elevators in 1913,

America, the Motherland of Industry, possesses some majestic original constructions which far outstrip anything of a similar kind achieved in Germany. The compelling monumentality of the Canadian and South America grain elevators, the coaling bunkers built for the leading railway companies and the newest work halls of the great North American industrial trusts can almost bear comparison with the work of the ancient Egyptians in their overwhelming monumental power. [T]he impact of these buildings seems to lie in the fact that American builders have retained a natural feeling for large compact forms fresh and intact. Our own architects might take this as a valuable hint and refuse to pay any more attention to those fits of historicist nostalgia and other intellectual fancies under which European creativity still lingers and which frustrate our true artistic naiveté. Walter Gropius, "The Development of Modern Industrial Architecture," from the *Jahrbuch des Deutschen Werkbundes*, 1913.

Georgia O'Keeffe, as a young painter, studied a book on abstraction by Kandinsky in 1913. French architect Tony Garnier proposed an Industrial City for 35,000, called *Une cité industrielle*, exhibited in 1904, and published later in 1918.

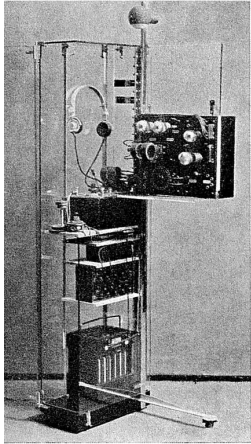
Film, photography and modernity are closely connected. Walter Benjamin described mass 'collective reception' as connecting cinema and architecture. Daniela Angelucci wrote, the 'notion of modernity ... has been associated with the very origins of cinema.' László Moholy-Nagy's 1930 proposal, a 'Room of Now' linked architecture and media in an early multimedia installation, possibly influenced by film projection in the 1927 sets of Berlin director Erwin Piscator. A modern relation of colonialism to native culture was documented in an early film of 1912 in British Columbia. Ethnographic photographer Edward Curtis used Kwakiutl North Americans of the Charlotte Strait to narrative life on the west coast. First titled when released in 1914, 'In the Land of the Head Hunters', it is now known as 'In the Land of the War Canoes.'

Avant-garde aesthetic and architectural and urban movements

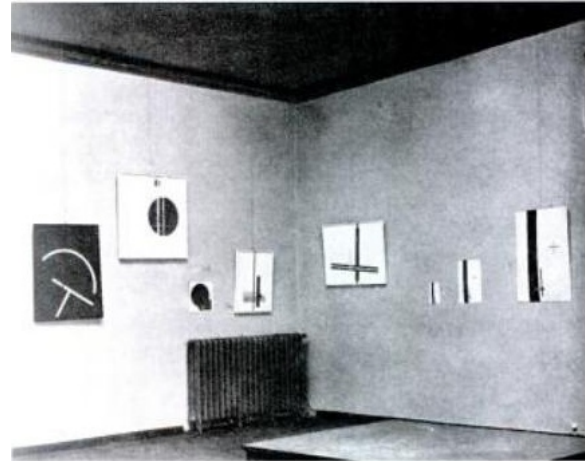
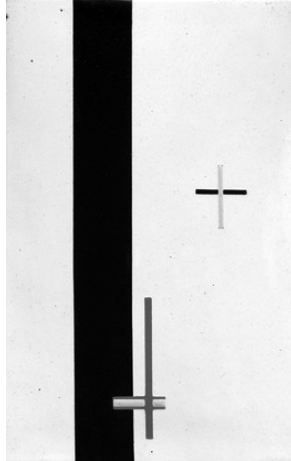
Exodus from the countryside and social crises refocused architectural programming from traditional, classic aristocratic themes of villas and palaces, to urban and socio-political needs— mass housing, education, railway stations, clinics, hospitals. The impact on architectural form was a powerful fusion of movements— from Cubism, the quasi-abstraction and sense of volume and movement on the picture plane, and sculptural assemblages by Picasso, Braque, then later Julio González; from Wassily Kandinsky, the impetus of a pure abstraction circa 1910; from Kazimir Malevich, the abstract geometric figure-ground of the Black Square and Rectangle painting series and the tectons; from Vladimir Tatlin, the assemblage of the corner counter reliefs from 1913 on, spatially positioned in upper corners; from Aleksandr Rodchenko, the monochrome triptych, Red, Blue, Yellow of 1921 signaled for him an endgame for painting and launch into design as agit-prop; from de Stijl, refinement and translation of painterly colour and form into proposals for tectonic spaces; from Surrealism, radically inspired by photographs, especially of a dream world—the city at night—

celebration of the unconscious and the libido—a subjective, psychological experience sensing urbanity.

The careers of many members of the avant-garde movements outlasted any experimental period. After a flush of tendencies—cubism, dadaism, futurism, expressionism, constructivism and suprematism, de stijl, surrealism, New Objectivity (*Neue Sachlichkeit*), came post world war dispersion then a post-war return of abstraction—abstract expressionism, situationism, Fluxus, Pop Art, Minimalism, Post-minimalism, Conceptualism, etc. Typically architectural movements remained slightly out of synch—Purism, Bauhaus, CIAM, Archigram, etc. —with respect to aesthetic movements,



Gerrit Rietveld with T. Schröder-Schröder Radio ca



Gerrit Rietveld + Truus Schröder, glass radio housing, 1926; László Moholy-Nagy Enamel Painting ordered over the counter, Berlin, 1923

weekly schedule

week 1 Introduction:

From the Industrial Revolution, Marx and Engels, to Haussmann and the Crystal Palace by Joseph Paxton, 1851 through to the Chicago School, to Detroit Factories, to the *Palais des Machines* of the *Exposition Universelle* of 1889 by Contamin and Dutert, to urban proposals by Geddes and Eugène Hénard to avant garde.

week 2

Presentation by Effie Patelos

Time permitting: Vienna- the Vienna Secession of 1897, the Wiener Werkstätte, established in 1903, Adolf Loos, Gaudi, the German Werkbund, Peter Behrens, Expressionism [Erich Mendelsohn, Bruno Taut, Hans Poelzig] Bauhaus, headed by Gropius, Hannes Meyer, Mies van der Rohe, with influence of Johannes Itten, Wassily Kandinsky, Marcel Breuer, Paul Klee, Ludwig Hilberseimer, László Moholy-Nagy...

week 3

Parisian and European Avant-gardes Aesthetic Architectural movements, Cubism, [Pablo Picasso, Georges Braque, Juan Gris], De Stijl [Theo van Doesburg, Cornelius Van Esteren, Piet Mondrian...] Futurism [Giacomo Balla, Umberto Boccioni, Filippo Tommaso Marinetti, Luigi Russolo, Sant'Elia], Italian Rationalism [Giuseppe Terragni], Franco Albini, Luigi Moretti, August Perret, Robert Mallet Stevens, André Lurçat, Le Corbusier, Pierre Jeanneret, Charlotte Perriand, Eileen Gray, Pierre Chareau and Bernard Bijvoet, Duiker...

week 4

Photography and the City, Dada, Brancusi, Surrealism and Dissident Surrealists, Walter Benjamin, Alberto Giacometti, Joan Miró, and Soviet Architecture, Suprematism, Constructivism, Kazimir Malevich, Alexandr Rodchenko, Varvara Stepanova Konstantin Melnikov, Vladimir Tatlin, and Liubov Popova and influence on Hadid and OMA. Aelita Queen of Mars <https://www.youtube.com/watch?v=je1blhS-7G8>

week 5

pecha kucha 1 (20 slides 6 minutes groups of 3) on the topic of avant-garde movements

week 6 pecha kucha continued, and time permitting: American Modernism, Frank Lloyd Wright, Nordic Modernism Alvar Aalto, Reima Pietilä, Aarno Ruusuvuori [Huutoniemi Church, Vaasa, Finland, 1961-4 AR]

week 7

Spanish and South American Modernism. Sert [Josep Lluís Sert i López], Oscar Niemeyer, Lucio Costa, Brasilia, Luis Barragan, Carlos Raúl Villanueva, João Batista Vilanova Artigas, Paulo Mendes da Rocha, Lina Bo Bardi, Alejandro de la Sota [Martínez], Alvaro Siza, Rafael Moneo... and Le Corbusier, Pierre Jeanneret, Maxwell Frye and Jane Drew, Chandigarh

week 8 Carlo Scarpa, Jean Prouvé, Louis Kahn, Ron Thom, Arthur Erickson, Metabolism, Buckminster Fuller

week 9

CIAM, Team X, English Modernism, James Stirling, Stirling and Gowan, Alison and Peter Smithson, and Brutalism, The Smithson's Charged Void

week 10

Pop Art and Architecture, Archigram, Minimalism, Conceptualism Cedric Price, Superstudio and Archizoom, Robert Venturi and Denise Scott Brown, Expo 1964 (Saarinen, Eames, IBM pavilion) and Expo 1967, Land Art, Appropriation, Re-enactment, Piano and Rogers.

week 11

Mainstream, Corporate and West Coast modernism: Charles and Ray Eames, Eero Saarinen, Pierre Koenig, Craig Ellwood, Frank Gehry, Patkau, John B. Parkin, Mies van der Rohe. Jacques Villeglé, Louise Bourgeois

week 12

Modern Structures – Robert Maillart, Félix Candela, Pier Luigi Nervi, Cecil Balmond; Contemporary architecture - Herzog and de Meuron, David Chipperfield, David Adjaye, Diller Scofidio Renfro, Sou Fujimoto, Junya Ishigami, Kengo Kuma, Jun Aoki, Toyo Ito, Kazuyo Sejima, SANAA, Sauerbruch Hutton, Zaha Hadid...

assignments

13 Sept week 1 discuss assignments. Assign urban haiku

20 Sept week 2 Hand-in urban haiku. Assign collage, papier collé, photomontage

27 Sept week 3 Hand-in: collage, papier collé, photomontage. Assign assemblage- photo of a sculptural maquette or involuntary sculpture.

4 Oct week 4 Hand-in: assemblage- photo of a sculptural maquette. Assign pecha kucha

13 Oct week 5 pecha kucha part 1 (20 slides 6 minutes) groups of 3-5, topic : avant garde movements - from Cubism, Dadism, Surrealism to conceptual art and post- minimalism.

18 Oct week 6 pecha kucha part 2 (20 slides 6 minutes) groups of 3-5, topic : avant garde movements. Assign: manifesto

26 Oct week 7 Hand-in: manifesto. Assign bibliographic note bibliography of a book, article, film or video, and image source. Presentation by Desiree Geib.

1 Nov week 8 Hand-in: bibliographic note bibliography of a book, article, film or video, and image source. Assign: list ten modern innovations, visit and document a local modern building.

8 Nov week 9 Hand-in: list ten modern innovations: visit and document a local modern building.

15 Nov week 10 no submission. Review and catch-up with any as-yet unsubmitted assignments.

22 Nov week 11 journal: one sentence per week, to create a paragraph, or abstract drawing series.

29 Nov week 12 no submission. Classes end 5 Dec.

final submission due date December 12, 2016:

collect all assignments, revise and collate and submit into ten-15 page PDF document linked by overarching theme.

COURSE EVALUATION: Late submissions may have marks deducted if submitted after the deadline.

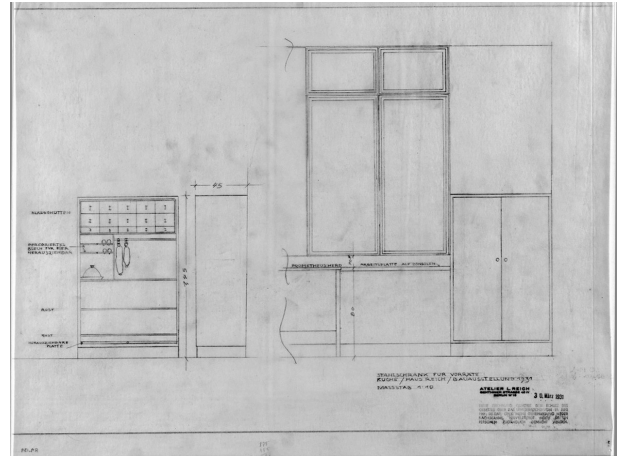
Weekly submission 5% x 7 + 10% pecha kucha

Attendance and participation 5%

Final submission 50% re-edited with an overarching theme and graphic schema

Evaluation criteria : Relevance to the topic of the modern in architecture and urbanism, originality, accuracy, intellectual vitality. Work will be evaluated on scope, ambition, depth and perceptiveness of research, clarity and conciseness of argument, as well as impact of presentation.

Course Objectives: generate a broad knowledge of elements of modern architecture, urbanism and landscape design, identify key issues in territorial and infrastructural design and planning, extend to include a wide scope from visionary propositions for 'new societies' to aspects of detail design of building components and furniture elements as related to issues of contemporary environmental design. Relate developments in architectural design to social movements, technological innovations, politico-economic shifts, and environmental issues.



Lilly Reich, Apartment for a Single Person - Boarding House, *Die Wohnung unserer Zeit* (The Dwelling of Our Time), German Building Exhibition, Berlin, Germany, view of living room, kitchenette drawing, 1931. Mies van der Rohe Archive

course texts

Ulrich Conrad, *Program and Manifestoes on 20th Century Architecture*.

Kenneth Frampton, *Modern Architecture, a Critical History* London: Thames and Hudson c 1980

Recommended: Jeff Wallace, *Beginning Modernism*. Manchester University Press 2010

bibliography

Jacques Attali, *Histoire de la modernité*. Paris: Robert Laffont 2013.

Charles Baudelaire IV Modernity page 12-13, 1859-1860, in Baudelaire, Charles. *The Painter of Modern Life and Other Essays*, ed. and transl. by Jonathan Mayne. London: Phaidon Press. 1964.

Adolf Loos, *Spoken into the Void*, published in 1900

additional books and articles

Hannah Arendt, Chapter 11, The Totalitarian Movement, I: Totalitarian Propaganda, in *The Origins of Totalitarianism*. Cleveland World Publishing Co. 1951. <https://archive.org/details/originsoftotalit00aren>

Georges Bataille, 'The Notion of Expenditure', 1933

Benjamin H. D. Buchloh, 'The Primary Colours for the Second Time', 1986.

Benjamin H. D. Buchloh, 'From Faktura to Factography', 1984. On Constructivism and productivism.

Françoise Choay, On Démolition, in *Métamorphoses parisiennes*, English version at architectureinphilosophy.wikispaces.com.

<http://architectureinphilosophy.wikispaces.com/file/view/ChoayFran%C3%A7oise+dela+demolition.pdf>

Jonathan Crary, *Techniques of the Observer, On Vision and Modernity in the 19th C.* MIT Press, 1988, 1992.

———, 24/7: Late Capitalism and the Ends of Sleep. London: Verso 2014. - erosion of the day/night distinction

Peter Collins, 'New Planning Problems', in *Changing Ideals in Modern Architecture, 1750-1950*. McGill-Queen's University Press c 1965, 2003. pp 218-239.

Walter Benjamin, 'The Work of Art in Age of Mechanical Reproduction', or '... Technical Reproducibility'

Friedrich Kittler, 'The City is a Medium'

Georg Simmel, 'The Metropolis and Mental Life'

John Summerson, 'The Case for a Theory of Modern Architecture', *RIBA Journal*, London, June 1957 pp.307-303. Reprinted in Joan Ockman, *Architecture Culture 1943-1968*.



Franco Albini, 'Room for a Man' design, VI Triennale di Milano, 1936 Albini also exhibited an apartment for four people.

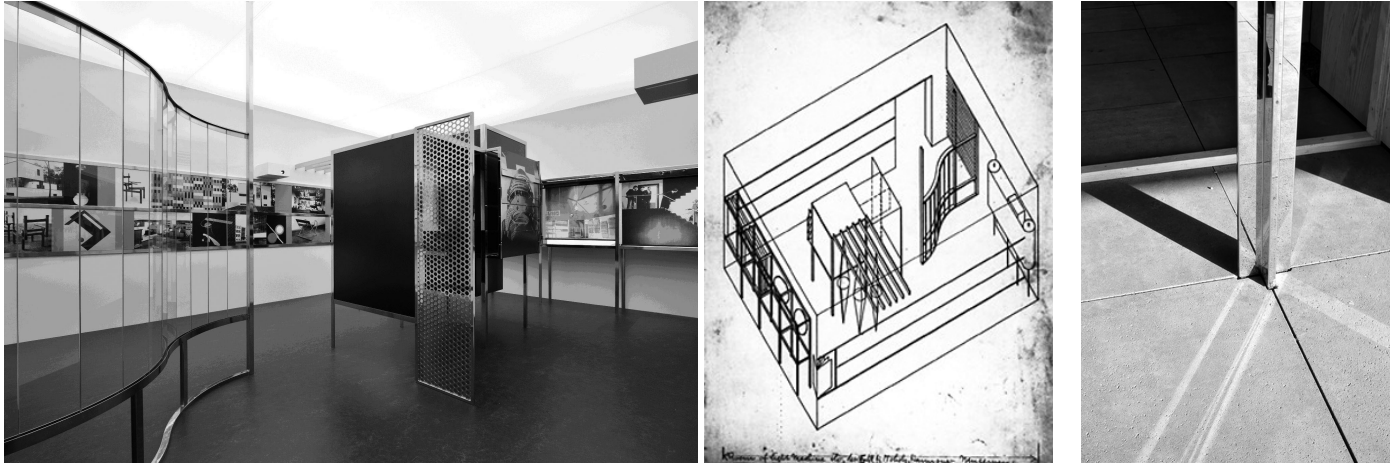
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 Bauhaus Bücher www.monoskop.org
 Tim Benton, *The Villas of Le Corbusier and Pierre Jeanneret 1920-1930*. Springer, 2007
 Andrea Deplazes *Constructing Architecture: Materials, Processes, Structures* Birkhäuser Architecture; 2nd ed. 2008.
 Edward Ford, *The Details of Modern Architecture 1928 to 1988*. 2 vols. MIT Press 2003
 Noam M. Elcott Rooms of our time: Laszlo Moholy-Nagy and ... multimedia museums
<http://www.columbia.edu/cu/arhistory/faculty/Elcott/Elcott-2011-Rooms-of-Our-Time.pdf>
 and <http://www.jstor.org/stable/info/10.1525/jsah.2010.69.2.265>
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 Rem Koolhaas, Hans Ulrich Obrist, *Project Japan. Metabolism Talks* Taschen 2011.
 Joan Ockman, *Architecture Culture 1943-1968*. Columbia Books Architecture/Rizzoli 1993.
 Denise Scott Brown, Robert Venturi, *Learning from Las Vegas*
Joshua Schuster, *The Ecology of Modernism: American Environments and Avant-Garde Poetics*. U Alabama Press 2015 p88
 Gottfried Semper (1803-79, German architect, critic, architecture professor) *The Four Elements of Architecture*, 1851
 John Summerson, 'The Case for a Theory of Modern Architecture', in Joan Ockman, *Architecture Culture 1943-1968*
 Manfredo Tafuri, Francesco Dal Co, *Modern Architecture*. Electa/Rizzoli 1987
 Leslie Topp, An Architecture for Modern Nerves: Josef Hoffmann's Purkersdorf Sanatorium. *Journal of the Society of Architectural Historians*, Vol. 56, No. 4 (Dec. 1997), pp. 414-437. <http://www.jstor.org/stable/991312>
 Anthony Vidler, 'The Modern Acropolis, Tony Garnier from *La Cité Antique* to *Une Cité Industrielle*,' in *The Scenes of the Street and Other Essays*, p 258

film and video excerpts

1914 Land of the War Canoes director Edward S. Curtis, with non-professional actors from Kwakwaka'wakw (Kwakiutl) communities in British Columbia.
 1913 Coco Chanel, Igor Stravinsky, *Rite of Spring*, 13 May, 1913, in Theatre Des Champs-Élysées, designed by August Perret, Igor Stravinsky premiered 'The Rite Of Spring' for Sergei Diaghlev's Ballet Russes, choreography by Vaslav Nijinsky. (Firebird 1910, Petrushka 1911) [Tonality, dissonance] re-enacted for Chanel-financed film in 2009.
 Paris Bright lights James Fox Mondrian studio Le Corbusier studio
 192 Walter Ruttmann
 1925 Sergei Eisenstein, Battleship Potemkin, Odessa steps scene
 1929 Dziga Vertov, Man with a Movie Camera, <http://www.youtube.com/watch?v=7ZkvjWIEcoU>
 1923-9 Man Ray films: Return to Reason, 1923, Anemic Cinema, 1926, Les Mystères du Château de Dé, 1929
http://www.openculture.com/2012/04/man_ray_and_the_icinema_puri_four_surrealist_films_from_the_1920s.html
 1930 Pierre Chenal, film script with Le Corbusier and others, L'architecture d'aujourd'hui, (Villa Stein at 5 min.)
<https://vimeo.com/67793221>
 1940 Charlie Chaplin, The Great Dictator, Kevin Brownlow and Michael Kluft, documentary, 'The Tramp and the Dictator', on Chaplin and Hitler (who were born a few days apart) and an account of The Great Dictator's production.
 1950 *D.O.A.*, a film noir drama directed by Rudolph Maté
 1955 Kiss Me Deadly, film noir produced and by Robert Aldrich, expressing anxiety and fear of nuclear radiation.
 1958 Le Corbusier in his studio at age 71 circa 1958. https://www.youtube.com/watch?v=2qtsL3o5W_U
 1964 The *Pawnbroker*, drama, directed by Sidney Lumet

1967 *2 or 3 Things I Know About Her (2 ou 3 choses que je sais d'elle)* dir., Jean-Luc Godard, 1967 *La Chinoise*, young revolutionaries in Paris.
 1972 'Not I', short dramatic monologue written in 1972 by Samuel Beckett, a minimalist monologue 1995 Scream
 2001 De/From Duchamp au/to Pop- Duchamp Yves Klein Warhol Art Arte Video
 2010 'Picasso and Braque go to the Movies', director Arne Glimcher, 2010; Technological influence on cubist painting
 2015 Big Eyes Dir. T. Burton



Lazlo Moholy-Nagy, Reconstruction of a 1927 project for a media installation, *Raum der Gegenwart* - Room of Now; Mies —1929 cruciform column

NOTES

Academic Integrity, Grievance, Discipline, Appeals and Note for Students with Disabilities: see www.uwaterloo.ca/accountability/documents/courseoutlinestmts.pdf. The text for this web site is listed below:

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please contact the department's administrative assistant who will provide further assistance.

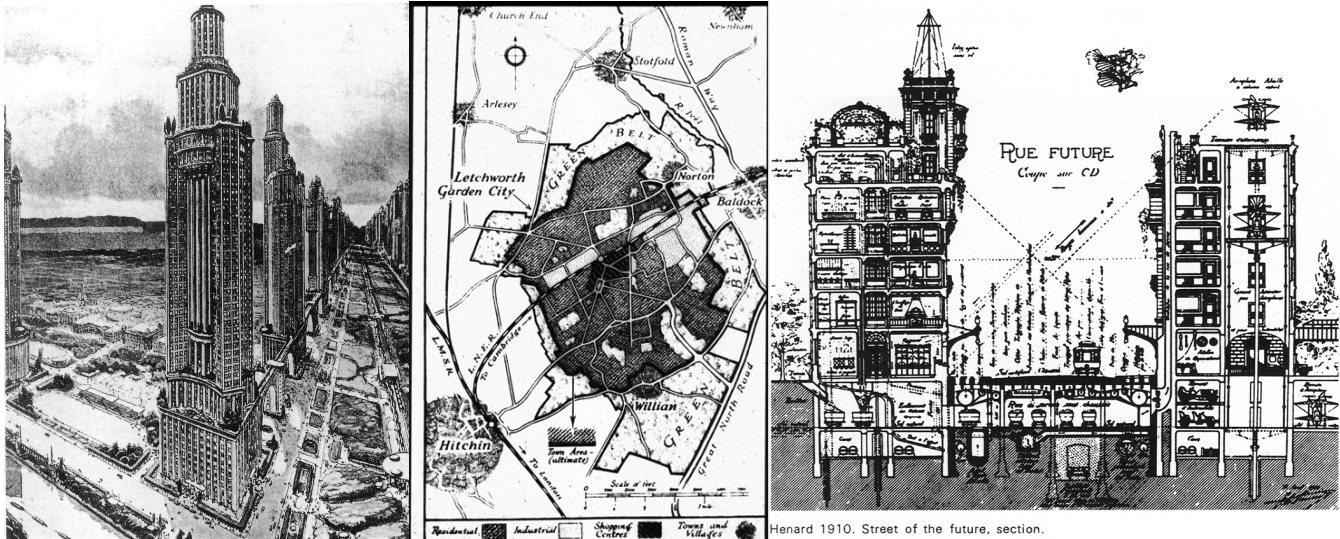
Discipline: A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: The Office for persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.



Margarete [Grete] Schütte-Lihotzky, Frankfurter Küche- Kitchen; 1925 Margarete [Grete] Schütte-Lihotzky—Bedsitter



Auguste Perret 1909 towers; Parker and Unwin, Letchworth Garden City, 1903; Eugène Hénard Proposal, future city section, 1910

A subjective list of some examples of inventions and innovations from the era of the Industrial Revolution onwards—steam railway, electric telegraph, steel...

Trains compressed travel time, as Wells wrote, '... railways [...] for any ordinary traveller [...] reduced the chief European distances to about a tenth of what they had been. H. G. Wells, *A Short History of the World*, p 256.

1804 Steam railway—commercial success 1814

1813 circular saw invented by Tabitha Babbitt, Shaker inventor, Harvard Shaker community.

1816 Nicéphore Niépce, photography, Louis Daguerre in 1838

1837 telegraph

1848 Anesthesia

1850 on - mid 19th c Sanitation systems

1850 Refrigeration

1855 Bessemer process steel production

1851 London World Exhibition Crystal Palace, Joseph Paxton

1850s elevator

[the paternoster, 1884 http://www.theelevatormuseum.org/f/f_1.htm

https://www.youtube.com/watch?v=Ro3Fc_yG3p0

1853 Elisha Otis, inventor of a reliable elevator brake, 1854 elevator brake demo Elisha Otis

http://www.salon.com/2014/02/23/the_most_important_invention_in_the_history_of_the_modern_city/

1863 Pasteurization by Louis Pasteur

1860s typewriters

1862 oil refinery first constructed

1867 Iddefons Cerdà published *Teoría General de la Urbanización*, Barcelona.

1876 telephone Alexander Graham Bell

1879 Thomas Alva Edison could be said to have created the first commercially practical incandescent light.

1880 Alexander Graham Bell, the Photophone used light to transmit sound - he wanted to develop the device to send images.

1882 New York first coal-fired electric power plant

1884 Steam turbine

1886 the end of gas and kerosene lamp

1886 Karl Benz patented the three-wheeled Motor Car in 1886, with Bertha Benz, pioneering founders of the automobile manufacturer Mercedes-Benz

1885 prior to 1885 American homes were heated by burning wood

1885 Home Insurance Building, architect William LeBaron Jenney, completed, used skeleton frame

1885 American Dave Lennox - riveted steel coal furnace

1885 Fayette Brown patented Blast furnace Charger

1886 Schulyer Wheeler invented the electric fan, a means of cooling until post- WW2 era.

1887 Nikola Tesla induction motor

1887 Emile Berliner is credited with the invention of the lateral cut, acid-etched Gramophone record in 1887.

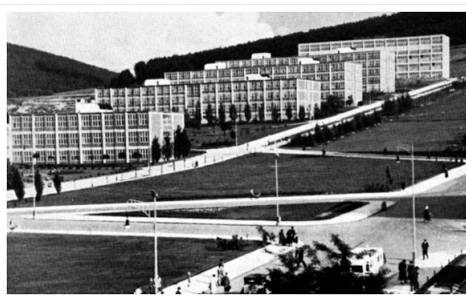
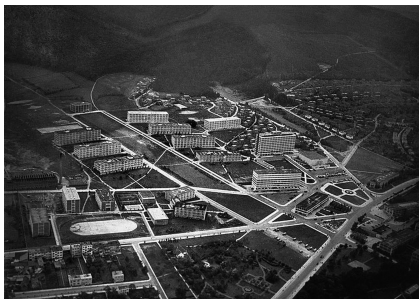
1890 Rand McNally Building Chicago, first steel frame building

1892 François Hennebiue pioneered reinforced concrete construction integrating column and beam in a monolith.

1897 Wireless communication- Guglielmo Marconi

1900 by end of 19th c 19th century the invention of low cost cast iron radiators
 1900 Sigmund Freud published *The Interpretation of Dreams*, Vienna.
 1902 Willis Haviland Carrier built first air conditioner, Montgomery, Alabama.
 1903-1913 aeroplane prototypes
 1903 Radioactivity – Nobel Prize to Marie and Pierre Curie
 1906 radio Marconi
 1913 electric welding process of Elihu Thomson
 1913 Fordist Assembly line, Henry Ford began production of the Model T in 1908, popular by 1913.
 1915 Patrick Geddes published *Cities in Evolution*.
 1918 Nitrogen Fixation - fertilizers
 1920 Scientific plant breeding
 1921 Eugène Freyssinet dirigible hangars, parabolic arches, early shell construction prototypes at Orly, and bridge design in 1910 led to 1930s development of pre-stressed concrete
 1921 Nobel prize to Albert Einstein, [not for Relativity, published in 1905]
 1928 Penicillin invention by Alexander Fleming led to modern antibiotics
 1930 Soviet Gulag Prison camp system: forced labour camps established on a territorial basis for political repression under Stalin.
 1939 Nazi concentration camps for forced labour, became death camps, genocidal execution machines.
 1935 in America, gas and oil-fired forced air furnace common in detached homes, replacing coal.
 1936 Turing machine invented by Alan Turing
 1939 nuclear fission
 1945 nuclear bombs dropped on and destroyed 90% of Hiroshima (pop. then 340,000) and the north of Nagasaki (pop. then 263,000).
 1947 invention of the transistor by John Bardeen, Walter Brattain, and William Shockley- semiconductor electronics
 1947 Levittown, prototypical suburban development, 17,000 houses, restricted to white residents; 'by 1950, 80% percent of Levittown's male residents commuted to jobs in Manhattan.'
 1950s central heating and air conditioning became common
 1954 Victor Gruen designed Northland Shopping Center, Detroit
 1956 Minoru Yamasaki architect of Pruitt Igoe, 2,870 units of social housing in St Louis
 1957 Monsanto built an all-plastic demo house for Disney Tomorrowland
 1960 birth control pill
 1964 Civil Rights Act in USA
 1969 Apollo 11 moon landing, and Arpanet, forerunner of internet, introduced
 1970s more plastic than steel produced in the world
 1972 Pruitt Igoe Social housing in St Louis demolished.
 1980s fax machines made image transmission feasible
 1980s – by late 1980s, personal computers became household consumer goods.
 1982 AutoCAD released
 1990s cell phone and email use proliferate
 2000 search engine optimization: google dominates
 2004 facebook launched and expanded to universities
 2005 youtube launched

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Zlin Bata Factory Town, master plan: Jan Kotera, urbanist – architect, Frantisek Lydie Gahura, late 1920s: Zlin Labour Square with Market Hall, 1928, Department Store, 1929-39, background: Masaryk Schools, 1927.